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LETTERS
ON THE
CAUSE AND TREATMENT
OF THE
GOUT;

IN WHICH SOME DIGRESSIVE REMARKS

ON OTHER

MEDICAL SUBJECTS ARE INTERSPERSED.

BY THE LATE

Robert Hamilton, M. D. of Lynn Regis,

Fellow of the Royal College of Physicians, F. R. S. honorary F. R. Phys.
S. Edinburgh, and C. M. S. London: Author of Observa-
tions on Marsh Remittent Fever, Water Canker,
Scrophula, and other Medical Tracts.

Nihil tam prodire possunt aut in rebus physicis, aut medicis, ad veritatem
elucidendam quam experimenta, et viis insuetis remove tenebram.

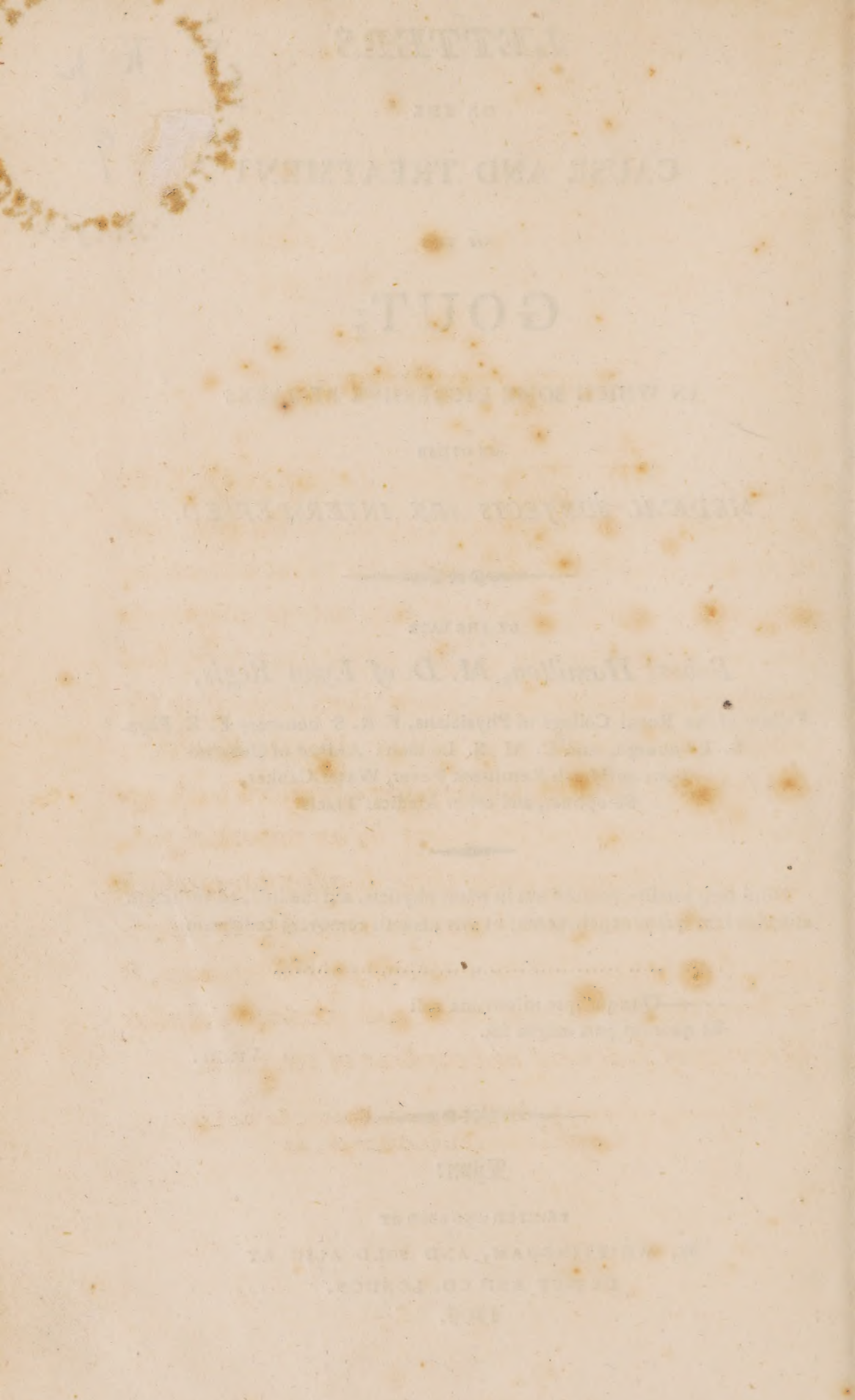
.....
— Quæque ipse miserrima vidi
Et quorum pars magna fui.

VIRGIL.

Lynn:

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ADVERTISEMENT.

THE Editor of these Letters on the Gout is induced to offer them to the public, in the hope that they may benefit those who suffer from that distressing distemper: though most probably not so completely finished for publication as they might have been, had the author lived to have given them himself to the world. But as the treatises on Marsh Remittent Fever and Water Canker were received with approbation and liberal criticism† by an impartial public, though labouring under those disadvantages which every posthumous work must in some degree experience, from a want of the author's superintendence, it is hoped that the present work will meet with similar liberality of judgment and candour of reception.*

* London, published by Mr. J. Mawman, Poultry, for the Editor.

† See the London Medical Review, &c.

DEDICATION.

TO

arthritic sufferers of every denomination, the following "Letters on the Gout," written for the use of a friend, are humbly offered by their

fellow sufferer,

THE AUTHOR.

Advertisement from the Author.

These letters were originally designed for the private information of a friend, but as many facts crowded upon the author which may be of utility to the public, he has thought it his duty to present them to it in the mode of his intended communication to his friend. The novelty of his ideas at first withheld him from offering them to the eye of the world, from diffidence of its reception of them ; but as further experience has confirmed the efficiency of his practice, and probably his theory or pathology of the disease, he commits his letters with confidence to the inspection of a liberal public as well as to the arthritic sufferer and medical practitioner.

He flatters himself that, although this work may not be treated with systematic order, it may deserve some attention from being founded chiefly on experience in his own person for more than twenty years, and any theory that may be advanced is founded upon real observation of fact or on deduction by reasoning by analogy from facts.

He is aware of the various opinions which may be entertained upon the novelty of ideas which militate against received notions ; and as most of the following letters were the spontaneous effusions of private correspondence, he has to crave the indulgence of the public for any incorrectness which may be observed in them ; but as they contain some new matter, on a subject old indeed, and deemed the *Opprobrium Medicorum*, he makes no

other apology for their publication. He hopes, as he has repeatedly received benefit himself from the practice he recommends, others may experience the same advantages, and should therefore, from his conviction of the relief to be found from it, have deemed himself a very unworthy member of society if he had not communicated his letters to the world.

He must however caution his readers not to expect a complete cure of an incurable distemper. If an alleviation of distressing symptoms, during the fit, and an enjoyment of life with tolerable ease in the intervals, with the prevention of decrepitude, too often the effect of supine apathy and resignation, be obtained, they are certainly no inconsiderable advantages to those condemned to arthritic punishment during life.

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LETTERS

ON THE

GOUT.

Letter I.

Dear Sir,

In your last letter you gave me a very disagreeable account of your health. You tell me that you have had the Gout, which has been very severe and left you much debilitated after the paroxysm ended; that you are chagrined and disappointed, and by no means satisfied with what you have read of the treatment of that disease, in the different authors which you have perused on the subject; that you had heard that I treated myself differently from the common methods employed by the generality of Practitioners, and with considerable benefit. Wherefore you request my opinion of the nature of this distemper, and desire to be informed of my method of treating myself.

Instead of wishing you joy, on this occasion, as too many unthinking people would do, I am really from a fellow feeling, sincerely sorry for you; as you have now got one of the greatest evils that can befall a professional man; for you certainly never will be entirely free from it again; that is, it will remain latent in your constitution, and occasionally paying you a very unwelcome visit.

I shall esteem myself happy in being instrumental in affording you relief, by furnishing you with any means in my power for that purpose; and therefore will give you all the information I can. And as it is a matter which has particularly engaged my attention for 20 years, with a view to alleviate my own sufferings, as well as those of others, I flatter myself I am competent to say something on the subject, which may be of use to you, and many a brother arthritic.

I shall deliver what I have observed in the plain language of candour; and what you will have relative to the treatment of it, you are to recollect is the result of experience, chiefly in my own person. But in the prosecution of the task you have set me, you must not expect a regular system, but a set of desultory observations, interrupted by such digressive remarks as may occur in the series of letters I shall have occasion to write, and you must excuse me for

repeating many things you are well acquainted with: but which being closely connected with our subject, it will be often necessary to recal to your memory, for the better elucidation of the matter immediately under investigation.

The first question you will naturally ask, is, what is this formidable distemper, this enemy that has invaded my constitution, and taken possession of it, never more to quit the premises? I can only answer,—a very painful disease, with peculiar symptoms and effects, the causes of which it must be honestly confessed, I no more know than you do; nor did perhaps any of the learned authors who have written so much unsatisfactory matter on the subject, and in no country more than this, know any more than either of us; they have guessed it is true, and we can do no more. Accordingly, I refer its origin, to a certain inexplicable something in our constitution, derived from our progenitors, and no more do I pretend to say of it, nor of the cause of its existence in the human race. And all that is to be found in the best authors, that any regard is to be paid to, from Hippocrates to the present time, is but vague conjecture, if we except the description of the disease; and in this respect none of them is more accurate than Sydenham, who was an Arthritic sufferer himself. But the poor invalid

has no occasion for this aid, to convince him of the identity of the disease he labours under ; his own feelings, and dire experience, being fuller, more descriptive, and more explicit to him, than all that has been collected on the subject ; as to the theories, they are the children of ingenious and fanciful imagination, often contradictory, sometimes absurd, and consequently the practice as contradictory as the theory.

Medical writers on the Gout, have ascribed its origin to a variety of causes. Among a great number the principal are said to be hereditary descent from arthritic parents, acids, wine, particularly acid austere wine, hard drinking, in the night especially, rich high seasoned food, excessive and premature venery, irregularities of every kind ; affections of the mind, as anger, grief, intense study, violent and fatiguing exercise, particularly on horseback in cold and wet weather ; to which Boerhaave has added, eating of asparagus, contagion, and others mention the poisons of arsenic and lead in adulterated wines, debility of the nervous system, and unnecessary exposure to inclement weather, &c.

Descent from parents is placed at the head of the catalogue, because it is the only, or if that is a better word, proximate, cause that can be admitted here, on which the real origin of the Gout depends. All

the rest may be with reason regarded, merely as subaltern or secondary, or, as they are called by some, remote causes, which by their activity do occasionally derange the economy of the system, from a healthy state, by which the gouty matter or principle, is developed, roused into action, and a paroxysm brought on, but how this is done we know not.

This singularity of opinion may be deemed presumptuous, and must be supported by some facts before it can gain credit; as it must appear very extraordinary that authors of great reputation should have advanced so many causes without some foundation. It is therefore incumbent on me to give my reasons for differing in opinion so widely, which I shall submit to your consideration with diffidence, relate with all the precision I can, and flatter myself that in the course of the investigation, I shall be able to adduce some proofs in the support of this very different way of thinking from others.

I. The first cause in our catalogue, and the only one here allowed as constituting the real origin or proximate cause of Gout shall be first noticed.

Authors in general admit of this cause, and daily experience proves, that it is a fact; and also proves that it is immaterial whether the father or mother of the arthritic persons actually had the gout, if their predecessors were afflicted with that distemper: as

it is often found, that a generation may escape the disease in its acute inflammatory form, yet the gout may have lain inactive and dormant in the constitution, and for want of a Phlogistic habit, or some other reason we know not, did not appear in an inflammatory state. Yet upon examination those subjects have been found to labour under indigestion, disorders of the stomach and intestines, accompanied with flatulences : and were frequently harassed with wandering pains in the head, back, and articulations, which were generally considered as arising from the Rheumatism, but in fact a chronic gout, disguised under a variety of shapes, was the real disease, and their descendants felt the truth of this fact, in a very distressing manner.

This I have seen in many families : I have known one brother occasionally attacked with chronic Gout all his life without any confinement but for a day or two ; and who never had constitutional powers to develop the gout latent in his habit, in an acute or inflammatory way, no other symptoms appearing than the wandering pains, and disordered stomach I have named : whilst another brother was tormented with inflammatory gout at certain periods, which gradually increased as he advanced in life, and rendered him a helpless cripple. Of the two the first brother's condition was the best, because he could

follow business. It did not appear that his health was much impaired by it, as he lived to the age of 70. The fathers in those instances were absolutely cripples, and there could be no doubt of the disease's descending from them to their sons. I am one of the sufferers in proof of this fact. My father was afflicted from an early period of life with inflammatory Gout, and many years before his death, was confined twice a year, between two or three months at a time. My brother never had any other symptom than wandering pains which never confined him, yet he was generally a hearty eater and a man of a full habit, but lax fibre. I know several instances of this kind, which I could adduce in proof of what I have advanced; your own observation will no doubt furnish you with many of the same nature; which may have passed unnoticed, as you were not before so nearly interested in the inquiry. And I apprehend, that there is no person afflicted with Gout but may trace it back to his progenitors, either in an inflammatory or chronic form; although it may have lain dormant in the constitutions of a generation or two, without being excited to action, and yet these people have been able to communicate this disease to their posterity.

Admitting what has been said respecting the communication by descent; it may be asked, as gout

must have had some origin in the human system; how was it first produced in the first gouty mortal, with the power of communicating it to his posterity? And why may it not originate in others, from the same causes it did in him at first? The answer must be involved in darkness! That it had a beginning is most certain: but in what manner, or from what cause, is a problem as difficult of solution, as the cause of gravitation, electricity, or any other inexplicable fact in philosophy: and therefore we must refer it, with other inexplicable facts, to the great Author of nature; who constructed the human frame in such a manner, and of such materials, that it must be liable to disease, decay, and resolution into its first constituent principles. For conducting with unerring rules, a system of decay and renovation, which seems necessary to the perpetuation of the whole, the reasons are undoubtedly wise, though to us incomprehensible.

I therefore make no doubt, but that every person afflicted with gout, had the stamina of the disease in his constitution when he came into the world; and that these stamina became evolved at a certain period of life, if his constitutional powers were equal to it, which in some may be sooner, in others later; but if his powers were unequal to the task, it lay dormant in the constitution, was conveyed to pos-

terity, and evolved in the constitutions of some of his offspring of powers more adapted to produce regular inflammatory paroxysms of the distemper.

But in order to point out the probability of this disease, accompanying the propagation of the species, let us take a short view of the operation of nature, in the formation, nutrition, and accretion of the human foetus, and see whether any hint can be gleaned from this wonderful process which may throw a light upon our subject ; in short to read to your mind,

“ How the dim speck of entity began

T’ extend its recent form and stretch to man.” CARTH.

I apprehend it will be readily granted, that the human ovum was originally in a fluid state, and that no appearances of its having taken any determinate form in the ovarium, are to be distinguished in the early periods of female life ; after it has taken the natural form, which we suppose is before the age of puberty, it does not appear on examination by the microscope, that the organized germ of an embryo, is to be discovered in it. Therefore it is after the impregnation by the semen masculinam, that we are to date the incipient organization of the future animal ; but by what modification this is effected, or what quantity of seminal fluid is employed for this purpose, we are utterly ignorant, and pro-

bably shall ever remain so. All we know is that the ovum and the semen were both once in a fluid state, and from certain circumstances of their operation on each other, the animal is formed. We shall pass over in silence every conjecture relative to this matter, and come to that period when the ovum in the uterus, has become so much enlarged in bulk, as to fill up its cavity, and come into contact with it; and that part of the ovum where the rudiments of the placenta are, has become attached to that part of the uterus to which it is contiguous: a period, when we suppose the rudiments of the living animal are formed, and the materials furnished by the ovum and semen, in what may be called its vegetative state in the uterus, for its support, are exhausted, and it now wants assistance from the mother, for its nutrition and increment. The placenta is the medium through which this process is conducted; and the blood of the mother passes from it through the umbilical vein in the navel-string to the embryo, and is received into its vascular system, where it is further laboured in the course of circulation through this system; and by a wonderful process of Nature's chemistry, the different materials are selected from this compound fluid, and by some specific attraction, applied, to complete the formation already begun of the heart, brain, nerves, blood ves-

sels, bones, muscles, membranes, &c. of the little animal, and the recrement blood is returned through the umbilical artery to the mother, as fast as it parts with its nutritive principles, and thus a circulation is kept up between the mother and foetus, until it becomes a perfect animal; and has sufficient powers to live without the mother's assistance; when its birth takes place. How all this is conducted I leave to physiologists to inquire. It is sufficient for my purpose to know that it is so: and as a proof of the fact, that a total interruption being put to this circulation between the mother and child, by any accident, will be succeeded by the death of the child.

From this short view of the matter, it cannot be difficult to conceive, how easily certain distempers, known to be hereditary, descend from parents to children.—If a subtile particle of matter, too minute to be an object of the senses, produces invariably a distemper of the same kind, by only being conveyed into the circulating fluids of so large an animal as man, by absorption or otherwise; how much more readily, may we not conceive, that a distemper blended with the very essence of the existence of the parents, as much as the very materials which furnish the existence of their little offspring, should be conveyed to their posterity. And surely the particles of matter constituting diseases thought to be

reditary, must bear a wonderfully larger proportion, in the ovum, and the semen, which impregnates it, to the bulk of both : than the subtile particle of matter requisite to produce, for instance, the measles or small pox, although very different from the disease under consideration, in an adult, can possibly bear to that adult.

As it is certain that the ovum was, at its first formation, in a fluid state, and furnished from the juices of the mother ; that the semen is fluid and furnished from the blood of the father ; it is natural to infer, that they must partake of the qualities of the original constituent juices of both the parents, be they good or bad. Hence therefore, it is easy to conceive, how the rudiments of disease may be blended with the rudiments of the foetus at conception, and how they may be afterwards continued to be conveyed with the materials furnished by the mother for its nourishment and increase, and the foundation of the gout laid in the constitution of the little offspring.

Some theorists have lately asserted that struma is not a hereditary disease, but is brought on by some adventitious injury, in any constitution, either from debility superinduced by other diseases or some other cause. This however is contradicted by experience. For instance, any abscess taking place

on the crisis of any acute disease; or suppuration, from a blow, or bruise, in any constitution, otherwise sound or free from the suspicion of any hereditary leaven of scrofula; digests kindly, granulations of sound flesh form, and fill up the cavity, and it soon heals. Far different is it with suppuration in any of the lymphatic glands, in a habit that is scrofulous by descent. Instead of bland, well conditioned, or what is called laudable, pus, the discharge is sanious, crude, and indigested. Instead of florid, healthy, granulations, a pale, smooth, glassy, morbid, ill conditioned, fungus arises, and the sore degenerates into an ulcer that does not heal, but remains open for many months, and even years, and if situated in the vicinity of bones, produces caries of them, and tedious exfoliations. Here we see that accidental injury, in a scrofulous habit, will, if we may use the expression, rouse, by an adventitious stimulus, the materia morbifica of scrofula, and produce the mischief we have noticed. Just so does it happen with a gouty constitution, an external injury, does not, it is true, bring on, always, suppuration and ulceration; but a blow on the elbow, hand, foot, or knee, a sprain of the ankle or wrist, will most certainly rouse the latent gouty virus, and bring on a paroxysm of the disease.

Some very ingenious modern physiologists, deny

the probability of the gout, or any other disease, being hereditary, upon another ground. They think it inconsistent with the simplicity of Nature, to suppose, that she would introduce disease, or any imperfection, into her work, at the creation of the foetus; but allow only, that a tendency to the predisposing cause of the disease, may be hereditary. With all deference to those ingenious men, allowing a tendency to diseased actions, which may be considered as a predisposing cause, is allowing an imperfection in the formation of the foetus, as much, as allowing the minute stamina of disease to descend from the parents: and, in short, seems to be using different words for the same thing. For in fact the rudiments of disease, or that active principle, whatever it is, which constitutes the gout, and which may be called the *materia morbifica* of the gout, is not in a state of morbid activity, when first conveyed into the rudiments of the embryo, from the parents, but appears to lie dormant and inactive in the habit, till at a certain period of life, it is evolved, and brought into action, by some accidental circumstance, or occasional exciting cause, and constitutes a fit of the gout; and after the fit is over, it again becomes latent; yet whilst the man is well, the disease may be supposed not to exist; but it certainly does so in a dormant state; and experi-

ence shows that the particles are capable of being again brought into action and a second paroxysm is produced, which constitutes with certainty the disease, which the repetitions of them sufficiently evince through life.

From this state of the matter, does it not appear, that even this tendency to a predisposing cause of disease, contended for, thus supposed to be conveyed from parents to children, must have some original cause, primarily existing, in the habits of the parents, to occasion this tendency or disposition to disease in their offspring? And is it not natural to think that the subtile particles of morbid matter alluded to, are the most likely causes to produce this effect? And notwithstanding all that has been advanced to overturn the long received opinion, that diseases, particularly gout, struma, and lepra, are hereditary: no ingenuity, no plausibility of reasoning, can contradict plain facts. How many instances are there daily to be met with, every where, of whole families labouring under, either scrofula, or lepra, who can trace those diseases back for several generations, among their forefathers; and who find, that neither the strictest courses of medicine, nor regimen, have ever been able to eradicate either of those diseases, from a single individual, or prevent either, from descending to their offspring.

LETTER II.

Dear Sir,

Having in my last given you my reasons for supposing descent from parents, to be the only original cause of the gout; I am next to consider the rest of the catalogue of causes alleged by authors to be the origin of that distemper in the human body, and which I have regarded only as occasional or accidental causes of exciting a fit. And this we may believe is done by those several stimuli on the nervous system, inducing pain and inflammation with a certain degree of fever necessary to develop the latent particles, promoting their accumulation, and bringing on a paroxysm of what is called the regular gout. This is perfectly consonant to the operation of every cause of fever whether specific or adventitious; if the morbid matter in the smallest particle of the small pox or measles is introduced into the system, it certainly first stimulates the nervous system, and excites pain and fever, which cease on the appearance of the specific characteristic phenomenon of the disease.

2. Acids are said to be a predisposing cause of the gout ; and what appears to be very extraordinary, is, that the generation of tophaceous concretions, vulgarly called chalk stones, is said to be produced by an acid tartareous salt, actually existing in the circulating fluids. How far these opinions are founded on fact will appear from the following considerations.

Acids in their pure state cannot enter the lacteals. The corrugating power of this species of acrid matter, must most probably, stimulate the orifices of this order of the absorbent system to contract, and effectually deny their admission. Were it possible for acids to enter these orifices, the chyle within the vessels to which they led, would be immediately coagulated by them, many and perhaps incurable obstructions, must ensue, the body could not be nourished, an atrophy, and probably death, would follow. But supposing it possible, that they did enter the lacteals, even pass through the mesenteric glands, and were carried through the receptaculum chyli and ductus thoracicus, and did in their *acid state* enter the left subclavian vein, the consequence must be an immediate coagulation of the blood in a large vessel in the vicinity of the heart, through which all the nourishment of the body was conveyed, a stagnation of blood, a suspension of circulation, and almost instant death.

We may from these premises conclude, that acids must be first neutralised and animalised in the stomach and intestines, in short their acidity totally destroyed, that they may, in their neutral state, be rendered fit to mix, first with the chyle, and afterwards with the blood, without hurting the fluidity of either, before they can enter the lacteals, and being now become an ingredient in a new compound, can be no longer considered as acids.

It may be objected to what is here said, that acids do actually exist in animal matter, can be detected in it and produced to our senses. For instance, first, the aerial acid or fixed air, which exists in all animal, vegetable, and we believe, mineral, substances, and indeed enters into their composition, as a body, and really, in its fixed state of combination with them, adds considerably to their solidity, weight, and bulk: and it is mixed also with our fluids. But it is certain that whilst it remains combined in the composition of these substances, it does not discover its acidity, but must be separated by some process before it becomes obvious to the senses as an acid.—It is therefore not to be considered in the light which we must here mean by an acid; for although it is more loosely connected with fluids than other bodies, yet its existence, pure and unmixed, as an acid, in the system, has never been ascertained,

although a small degree of heat, even that of the atmosphere, will separate it from fluids out of the body; a decomposition must therefore take place in the mixture before it can appear in its acid form, as daily experiment sufficiently evinces.

The second is the phosphoric acid, a substance produced from animal matter. This acid is entirely the product of chemical analysis, and it is found no trifling process, by every chemist, to separate it from the other matters with which it is combined, and that a most intense degree of heat is absolutely necessary for that purpose.

Every book of modern chemistry shows, and every chemist knows, that the process for making Kunckel's phosphorus from urine, is operose and laborious, and that an intense degree of heat is requisite to complete it. Dr. Henry Gahn, of Stockholm, first discovered a method of extracting the phosphoric acid from bones. The excellent Scheele prosecuted and confirmed the experiments; and those ingenious chemists, by labouring together in the same pursuit, extracted phosphorus from this acid by means of the phlogiston of charcoal, by a much less operose process, than that by which it is obtained from urine. Macquer, Poulletier, Proust, and others, have repeated the experiments in France, and obtained the Phosphoric Acid from burnt hart-

horn.* All those chemists suppose that the earth of bones is a composition of the calcareous earth, saturated with the Phosphoric Acid. Macquer tells us that Mr. Proust has discovered a particular substance, which constantly accompanies the Phosphoric Acid in the animal fluids; he has not however shewn what it is, but is prosecuting the subject with assiduity.

Mr. Bertholet, a french chemist, in a memoir read before the Royal Medical Society at Paris, says, that the Phosphoric Acid is a very important agent in the animal economy; that it is every where active in the system, and is expelled by perspiration and urine. That he has found it in a separate state or rather combined to excess (so as to predominate) with calcareous earth in the urine, which has been deemed an alkalescent fluid by physicians. That perspirable matter tinctures blue paper of a red colour, which he attributes to the Phosphoric Acid it probably contains. Thinks, that the urine of persons subject to the gout and rheumatism contains naturally much less of the Phosphoric Acid than that of persons in health: but during a fit of the gout much more of this acid; though not more than that of a strong healthy person; and in persons very subject

* Dictionnaire de Chymie, Article Os.

to the gout, could tell if a fit was coming on, by the quantity of acid in his urine. And supposes that the Phosphoric Acid is not so well discharged in persons subject to the gout, and wandering rheumatic pains, as in healthy constitutions, but that it wanders, and when accumulated to a certain degree, produces irritation, and reaction of the vital organs, a natural effort of the constitution by which it is partly thrown on the extremities and partly on the kidneys. But that this acid is combined with a greater or less quantity of calcarious earth, and an animal matter, and often forms depositions, greatly resembling bone, and those gouty earthy collections called chalk stones, in the extremities, and calculi in the kidneys and bladder.—Supposes—that if the sweat contains the Phosphoric Acid, may it not owe its stimulating powers to it? And may not this acid, being dispersed in the cellular membrane, produce catarrhs, or on the intercostal nerves pleurisies? And when the urine appears limpid and pale in fevers, or nervous disorders, may not this acid be the irritating principle that disturbs the whole animal economy? And suspects that this acrimony, whose existence (he thinks) is certain, may be substituted in many cases, for those imaginary acrimonies, by which the nature of diseases has been attempted to be explained.

Here is a new species of humoral pathology, by which the cause of many of the most terrible diseases has its existence in the habit from the first formation of the fœtus, to the grave, which is the Phosphoric Acid—if there really existed such a substance in an acid state in the system, which would appear incompatible with life, and even Bertholet allows it to be combined with other matters, and it therefore must undergo some decomposition before it can appear in a separate, pure, acid, state, and as this requires the addition of the strong vitriolic acid and the most intense heat to effect it out of the body, we cannot think it possible to be done in the body by the power of mere animal heat, and therefore this ingenious chemist must be mistaken. Besides, some modern chemists have suspected, that the Phosphoric Acid does not exist even in combination with other matters, in bones, in a state of nature, but is formed by the vitriolic acid employed in the extraction of it, which by combining in a peculiar manner with animal earth, and other matters, perhaps Phlogiston, by means of the power of an intense heat takes on this appearance. The effect of the compositions made to imitate the Bolognian stone, seems to favour this conjecture. The late Mr. Canton's was the best of any. His preparation, taken from his paper in the Ph. Trans-

actions, is, three parts of the white powder of calcined oyster shells, and one part of the flowers of sulphur, intimately mixed, and rammed into a crucible $\frac{1}{2}$ inch deep, and kept red hot in the middle of a good fire for an hour, and not turned out of the crucible till cold. The parts found to be best on trial, are to be kept in a vial with a ground stopple. A small quantity of this powder exposed a few seconds to the light, will be so luminous in the dark, as to enable one to distinguish the hour on a watch dial plate. In this preparation there is the vitriolic acid, and phlogiston in the sulphur, and the calcareous earth, and probably animal matter, in the oyster shells, materials not widely different, from the vitriolic acid and the earth of bones. Part of the acid may be phlogisticated, and dispelled with the phlogiston by the heat during the process. Perhaps also the phlogiston requisite to render it luminous, may be supplied by the sun's rays. Phosphoric Acid is not luminous itself, but only becomes so by the phlogiston it receives from the charcoal in the distillation of phosphorus.

The changing of blue paper red, by sweat, on the surface of the skin, may be owing to other causes. The sweat is now allowed to be immediately secreted from the blood, by the exhaling orifices of minute arterial ramifications, opening on the

surface of the skin. Were it acid, according to Bertholet, and that the Phosphoric Acid were excreted from these orifices, it must exist in an acid state in the circulating fluids, which we conceive to be impossible; and the only circumstance that could give a colour to the hypothesis, of its being the Phosphoric Acid that gives this change of colour to the blue paper, is to suppose that a decomposition of the sweat, and a separation of this acid from it, must take place the instant this fluid passes the excretory orifices on the surface of the skin; but as it has been shown, that it requires the presence of the vitriolic acid, and the most intense heat of a chemical furnace, to accomplish the separation of the Phosphoric Acid, from the matters with which it is combined; I look upon it as being impossible to be done by the heat of the human body. Therefore this change of colour cannot be owing to the Phosphoric Acid. Nor is it at all necessary to oblige Nature to perform a task she appears to be unequal to; as the change of the colour of the paper laid on the sweating limb, from blue to red, may be more easily accounted for; which I shall endeavour to point out. I have tried the experiment and have never succeeded in the most severe fit I ever had.

Fixed air was discovered by our late ingenious and worthy Friend, Mr. Bewley, and afterwards by

Bergman, to be an acid ; although neither knew the other's pursuit, they were both employed in the same inquiry ; but Bewley was certainly the first who discovered this important fact, and it is now admitted into the Tables of chemical attractions, as an acid *sui generis* under the denomination of the Aerial Acid. This substance is perhaps the most universal acid in nature ; it has already been observed that it enters into the composition of most bodies perhaps into all, and adds considerably to the solidity, weight, and bulk of solid bodies, and is also a component part of fluids, and certainly of those of the animal system. It is perhaps most abundant in calcarious earth, and is separated from it by fire, or acids which have a greater chemical attraction or affinity to this earth. Dr. Black has shown in his ingenious paper on magnesia, that it is the expulsion of this principle by fire, that converts the mild calcarious earth, to the caustic, or quick lime, a discovery of the greatest importance in chemistry ; but it is not the business of this inquiry to go any farther into this matter, than what relates to the present subject of investigation ; the cause of the apparent acidity in sweat. And therefore it is now only proper to observe, that the aerial acid enters into the composition of fluids as well in the animal body as out of it ; is the substance on which the properties of mineral waters,

as those of Pyrmont, &c. chiefly depend, and which from its predominancy are termed acidulous ; and is the medium by which solid matters, as calcarious earth, iron, &c. are held in solution in those waters. It is present in the fluids of the animal body, being supplied by the ingesta, and copiously passes off by the secretions, particularly urine and sweat. But although it requires fire or mineral acids, and sometimes both to expel it from solid substances ; fermentation however will separate it from vegetable matter ; and it is found to be so loosely connected with fluids that a very small degree of heat, even that of the atmosphere, is, when the fluid is in a state of rest and exposed to the external air, sufficient to loosen its attraction to ~~the~~^{it} fluid, and then a decomposition takes place, it escapes in its acid form into the atmosphere, and the solid matters, as calcarious earth, iron, &c. which were held in solution by its means, in the watery fluid, are separated from it and precipitate. As it is so loosely connected with water as to be separated from it by the heat of the atmosphere only ; no wonder that the heat of the human body augmented by fever, should separate it from the sweat upon its surface, and being detained and imbibed by the moistened blue paper, change it into a red colour, on the gouty limb, at the decline of a paroxysm.

Every one conversent with the treatment of sick people, in any epidemic season, or in some climates, or the local situations in the same climate where fevers rage more extensively than in others, must have observed a sour smell issue from persons under the influence of a copious critical sweat. This circumstance, may, at first sight, seem to favour Bertholet's opinion, of the actual discharge of the Phosphoric Acid, by the pores of the skin. But on a little attention to this matter, this sour smell will probably appear to arise from another cause, and that is the acetous fermentation of the sweat, copiously ascending from the patulous orifices of the excretory vessels in the skin. There is not a doubt, but much saccharine matter is discharged in mixture with the sweat; and when the quantity of this evacuation is so considerable, as it very frequently is, as to wet the sheets and bedcloths so much that it may be wrung out of them by pressure, and the bed itself is so thoroughly soaked with it, as even to have it run through the sacking bottom and drop on the floor; it is not difficult to conceive that a fermentation may ensue, from the great heat, run speedily into the acetous fermentation, and thus account for the sour smell. We know that such a smell frequently occurs in women that give suck, when their linen is wetted, by the redundant dis-

charge of milk from their breasts, and that this is owing to the saccharine matter in the milk running speedily into the acetous fermentation by the heat of the women's bodies.

Another thing worthy of notice, is, that by fermentation the aerial acid is let loose and escapes, as fast as the decomposition takes place of the matters, subjected to that process, as in the case of wine and beer.

The large quantities of an acid fluid ejected from the stomach, when that organ, and some other of the abdominal viscera, are attacked with the gout, have been adduced in proof, that acids are among the predisposing or original causes of the gout. From some inquiry into the production and existence of of this acid, which is symptomatic to more diseases than one, it will probably appear, that, as the acid vomited up is the same in all of them, it is in reality the effect of the disease and not the cause of it.—But as the production of this acid seems connected with the process of digestion, it may be proper, to make some remarks on that necessary operation, in the economy of animal life, which may throw some light on this subject.

Notwithstanding the great number of experiments put in practice by modern philosophers and physiologists, we are probably still in the dark, as to

the mode in which digestion, and chyfication are really carried on in the stomach and intestines. This seems indeed to be evident, from the difference in opinion which these gentlemen entertain, and the different deductions they draw from their experiments. We certainly do know, that our food which consists of animal and vegetable substances, is digested ; that the most nutritive part of it, is converted into one uniform liquid, the chyle, which we also know is carried into the habit, for the nourishment of the body, and that, the unconverted part of it is discharged as useless. That there are certain liquors separated, as saliva, æsophagal, and gastric juices, that the bile, pancreatic, and other juices, are secreted by their proper glands, and pass by their proper ducts into the stomach and intestines ; all of which are supposed to be concerned, in this great alimentary process ; but we cannot positively say what share each has singly in it.

The late Sir John Pringle, and Dr. Macbride, from experiments on alimentary substances (which you will find at large in their works) were led to suppose, that digestion depends upon the fermentation of the food in the stomach. Abbé Spallanzani thinks, on the contrary, that neither the sweet, acetous, nor the putrid, fermentation of the chemists, takes place in the stomach ; but that the solvent

power of the gastric juice is the only efficient cause of digestion. Dr. Edward Stevens and some others have taken up the same opinion.

That excellent anatomist and ingenious physiologist, Mr. John Hunter, thinks "the process of digestion different from every natural operation in the change of bodies.—It is not fermentation, though it may somewhat resemble it. Fermentation is that spontaneous process, and is that natural succession of changes by which vegetable and animal matter is reduced to earth ; therefore different from digestion which converts them into chyle ; in the formation of which (he thinks) there cannot be a decomposition, similar to fermentation. It is not a chemical solution, but it is an assimilating process, a species of generation, two substances making a third: the most curious circumstances of which is, the conversion of animal and vegetable matter into the same substance or compound, which no chemical process can effect; Chyle, (he thinks) is composed of gastric juice, and the most digestible substances perfectly converted, and that the quantity of gastric juice is nearly equal to that part of the food really converted into chyle ; which evinces the necessity of a quick secretion of a large quantity of that fluid, which however is not lost to the constitution." And in the paper subjoined to that on digestion, in his

observations of different parts of the animal economy, and which was before published in the *Philos. Transactions*, vol. 62, he says that “ animals, or parts of animals, possessed of the living principle, introduced into the stomach, cannot be acted upon so long as the animal principle remains ; hence it is that worms, &c. may live and even be hatched in the stomach, but the moment they lose the principle of life, the stomach acts upon them and digests them like other dead substances. Indeed if it were not so, the stomach itself must have been made of indigestible materials ; for if the living principle was not capable of preserving animal substances from undergoing that process, the stomach itself would be digested. But we find that when the stomach is deserted by the living principle, it is not only capable of being digested by the digestive powers of other stomachs, but by the remains of that power which it had of digesting other things.” The power he means is the gastric juice, a quantity of which might have been secreted before, and have remained in the stomach after death. To the solvent powers of this juice he attributes “ those holes found in the great end of the stomach in dead bodies, which have been supposed erroneously to have arisen, from disease, and to have killed the patients ; but as those apertures are more frequently found in those persons

who have suffered a violent death, than in morbid bodies, and as the apertures were large, ragged at the edges, and appeared to be as it were, in a tender half state of solution; and the food which had been in the stomach had passed through the apertures, into the abdomen; he has no doubt but they were the effect of the digestive process, by means of the gastric juice after death." This is an outline of the opinion of this ingenious gentleman, the matter at large you will find in his *Physiological Observations*, on certain parts of the *Animal Economy*. From his further experiments and observations, promised to be communicated to the public, we may hope to obtain further information. As in this however he has taken no notice of the use of the *Bile* in Digestion, I suspect from an expression (page 174) that he regards it as an excrementitious fluid. He says, "that the digested or animalised part, when carried into the intestines, is attracted by, or clings to its villous coat, as if entangled among the villi; while the excrementitious part, *such as Bile*, is found unconnected in the gut as if separated from the other."

Spallanzini will hardly allow that fermentation ever takes place in the stomach. Mr. Hunter does not doubt but it can go on in the stomach, but when it does happen, it arises from the powers of digesti-

on being defective. It appears, however, from the following circumstances to exist pretty generally, if not always, as a necessary process. Fixed air enters largely as a principle, into the composition of alimentary matters, vegetable or animal; saccharine matter is also a large ingredient in them, particularly in the vegetable, and in the state of crystalized sugar, is separately used in abundance as an article in diet. The experiments of Sir John Pringle and Dr. Macbride have shown, that, with a certain degree of heat, out of the body, the process of fermentation, most readily succeeds in the decomposition of alimentary animal and vegetable substances, and that during this process fixed air is as freely extricated, as in the fermentation of vinous liquors. The ingenious Mr. Henry, from experiments related in the Memoirs of the Society of Manchester, has supposed that fixed air is the principle on which fermentation depends; for by throwing fixed air, extricated from chalk, by means of the vitriolic acid, into a mixture of flour and water, he made a ferment with the same properties as yest, and made fermented bread with it. But had there not been saccharine matter in the flour I suspect this would not have succeeded. Perhaps fixed air may have a specific attraction to the saccharine matter, and perhaps from its abundance in the saccharine juices of vegetables, the great

quantity let loose by fermentation arises, and probably without its presence fermentation would not take place, as there would be none to extricate. But be that conjecture as it may, we are certain of one fact, that no fermentation will take place in vegetable matter, without the presence of sugar. Upon saccharine matter, the intoxicating spirit of the vinous fermentation, and the vinegar of the acetous seem to depend.

Sugar is contained in the grape, in all fruits capable of being fermented into wine; is added to all made wines, to promote fermentation and give them a body; is in the germ of leguminous seeds in incipient vegetation, and upon its being developed in the barley by vegetation in the steeping, and afterwards, arrested in the malt on the kiln by the fire, the whole success of beer brewing depends. It is the saccharine matter extracted by the hot water, (afterwards called wort) that is the basis of the whole process. Chemists have detected sugar in all vegetable and in some animal substances. A decoction of the tops of the spruce fir, is, by the addition of molosses, fermented into a vinous liquor or beer and is a wholesome and pleasant beverage. A mixture of sugar and water only, will ferment, first into a wine and then into vinegar; many housewives make their vinegar in this way. From the fermentable properties of the ingesta, thus largely furnished with

sugar, the admixture of the natural secreted fluids, the saliva, œsophagal, and gastric juices, which may perhaps act as ferments, and the uniform warmth of the part; I am led to conclude, that a fermentation probably comes on, after a meal, in the stomach. We have indeed more than probability on our side, we have real evidence that it does take place, and whatever solvent power may be ascribed to the gastric juice, or any other, fermentation is part of the process of digestion in the living body. Our evidences are the following.

Every person in full health, must have observed eructations of air from his stomach after a full meal; and that the air thus discharged, did in its passage, impress the fauces with an acidulous pungency, and the tongue with an agreeable acid taste. Which impressions were exactly similar to those arising from the eructations of the gas, which happen after drinking new beer in a state of fermentation; the natural, or artificial mineral waters, or from the mixture of acids and alkalies, taken in the act of effervescence, which we know to be fixed air. There can be therefore little doubt but these eructations after a full meal are chiefly fixed air, which evidently appears to be extricated from the alimentary matters in a state of actual fermentation in the stomach. But we have a further proof of this, sometimes, (espe-

cially if much exercise is used immediately after the meal) by the regurgitation of some of those alimentary matters with the fixed air; which from their sweetish acidulous taste, appear to be actually in a state of fermentation.

We have here an evidence, that fermentation takes place in the aliment in the stomach even in full health, and from Mr. Hunter's curious account, we may conclude that the gastric juice is a powerful solvent, and he further says stops fermentation. How is this difference to be reconciled, since two processes, the one actually destroying the other, cannot go on at the same time, in the same matter? But, may they not go on at different times, and may they not be necessary to succeed each other in gradation, to complete the great object of digestion? May not fermentation be necessary to the separation of the component parts of the vegetable matters employed in food, previous to their more perfect solution by the gastric juice? And may we not suppose that the fermentation ceases before the action of the gastric juice begins, or when the fermentation is ineffectual, may it not stop this process, and act on the undivided aliment, and by the solution, and animalization of it, finish the alimentary process in the stomach so far as that viscus is concerned? It certainly is not straining

probability to suppose that the mixture of the bile is afterwards necessary in the duodenum and other small intestines, first perhaps to correct any redundant acidity, and then to complete the assimilation and animalization of the aliment and, in short, the formation of the chyle; Sir John Pringle tells us that alimentary mixtures with the addition of bile never tasted sour after fermentation was over. We know that the bile has always been reckoned particularly instrumental in this business, by Haller, Boerhaave, and the other first rate physiologists of the present century.* But be those conjectures as they may, all the modern experimental physiologists agree in one thing, the presence of an acid in the stomach.—How is this acid produced? Is it by a natural process in health? or is it the consequence of a morbid affection? May we not conclude, that the presence of a certain quantity is always necessary in health, from this circumstance, that many girls, from a kind of instinct, are fond of drinking vinegar, and eating acid fruits; which seems to indicate a deficiency of the natural quantity? And on the contrary, other girls, when there is a redundancy so great as to become painful, from a similar instinctive principle, eat chalk, lime, and other alkaline substances, to destroy this superabundance.

* The eighteenth.

From these two extremes, thus taking on morbid appearances, by which it is evident that digestion is much impaired in both, we may conclude that a certain quantity of acid in the stomach is necessary to healthy digestion.

Sir John Pringle tells us, that in a diseased state of the digestive organs, the acid in the stomach is so acrid as to excoriate the throat and set the teeth on edge ; which fact I apprehend every person has experienced less or more, at some period in life, as this takes place in many diseases. He thinks, that this can hardly be accounted for, from the common theory of digestion, but easily, from the principle of fermentation: by which not only a strong but an austere acid may be produced, “ from food consisting only of flesh, bread, and water; ” as often as the stomach is relaxed, or any way disabled from conveying the whole aliment into the intestines: for what is left having time to undergo a complete fermentation is thereby changed into a harsh sort of vinegar.

Mr. Hunter says, “ It may be admitted as an axiom, that two processes cannot go on at the same time in the same part, of any substance; therefore neither vegetable nor animal substances can undergo their spontaneous changes while digestion is going on in them; a process superior in power to fermen-

tation. But if the digestive power is not perfect, then the vinous and acetous fermentation will take place in the vegetable, and the putrefactive in the food of those animal which live wholly on flesh.—The gastric juice therefore preserves vegetables from running into fermentation, and animal substances from putrefaction; not from any antiseptic quality in the juice, but by making them go through another process, it prevents the spontaneous change from taking place. In most stomachs there is an acid, even though the animal has lived upon meat for many weeks; this however is not always the case, therefore we may suppose it is only formed occasionally. Whether the stomach has a power of immediately secreting an acid, or first a sugar which afterwards becomes acid, is not easily ascertained; but (says he) I should be inclined to suppose, from analogy, the last to be the case; for animals in health seem to have a power of secreting sugar, as we find in the milk; and sometimes in urine, from disease.—The acid prevails sometimes to so great a degree, as to become a disease, attended with very disagreeable symptoms, the stomach converting all substances which have a tendency to become acid, into that form; the sugar of vegetables, and even vinous spirits, turning directly into an acid.—To ascertain whether there is an acid naturally in the stomach, it

will be proper to examine the contents before birth, when the digestive organs are perfect, and when no acid can have been produced by disease, or any thing that has been swallowed. In the sleek calf near the full time, there is no acid found in the stomach; although the contents have the same coagulating powers with those of animals who have sucked.

As we find (continues he) stomachs possessed of a power of dissolving the whole substance of a bone, it is reasonable to suppose that its earth is destroyed by the acid in the stomach."

I am inclined with Mr. Hunter, to think, that the conversion of substances in the stomach, into an acid, is more likely to depend upon a saccharine matter than an acid actually secreted from that organ: because, we know of no glands, in the human body, nor indeed in any carnivorous or gruminivorous animal, that secrete an acid liquor.—I look upon the acid of ants and that of the small green insect, called by the french puçon or puçeron, which infests the stalks of gooseberries, currants, and some other vegetables, the origin of which acid is not known; to be more probably a collection of vegetable acid matter, extracted for their nourishment, and retained in the stomach or some other receptacle for that purpose, in the same manner as bees do

honey.—The acids of these insects are I apprehend out of the question in our present enquiry. Sir John Pringle, we find, supposes, that the acid in the stomach is produced by fermentation. Mr. Hunter inclines to suppose the production of this acid to be owing to a secretion of sugar, which afterwards becomes sour, rather than that there is an immediate secretion of an acid from the stomach. It is certainly immaterial which way sugar is introduced into the stomach, whether by an actual secretion from a glandular system in that viscus, or in our vegetable food, or in the form of crystalized sugar itself, of which large quantities are continually used as articles in diet; it must, sooner or later, undergo the acetous fermentation before it becomes sour there. Unless we can suppose, that the stomach has a power of decomposing the sugar, in a chemical sense, and speedily separating the saccharine acid from it, (an operation of no small difficulty to every working chemist) which I cannot help thinking is at least as improbable, as the separation of the Phosphoric Acid already noticed.

But in whatever way acids are produced, it is immaterial as to the fact of their existence in the stomach; as there are certainly great quantities generated there, and ejected by vomiting in simple inflammations of the stomach and adjacent parts, the

cholera morbus, the onset of several fevers, particularly those of the remittent and intermittent kinds, dyspepsy, as well as the gout in the stomach, and every other disease by which that organ is affected. The reason of this I am led to think, is the morbid state of the digestive powers, brought on by those several diseases; by which circumstance, as digestion is impeded, the acctous fermentation is produced.

The acid ejected by vomiting in any one of the diseases above named, does not appear to be different in quality, from that which is ejected in any of the others, and the quantity in all, seems to depend entirely upon the violence or quantity of the disease. Whence it appears evidently to be owing to the disease's having materially hurt the powers of digestion. It may be alleged that gout is essentially different from several of those diseases. It certainly is so, but the parts generally affected with the gout, in its acute form, whether the head, stomach, or extremities, are affected with inflammation less or more at the attack. Most certainly simple phlegmasis, and erysipetalous inflammation affect every part of the human body. So does inflammatory gout; and we may with as much parity of reason say, that because acids are ejected by vomiting in simple or erysipetalous inflammation of the stomach, of the same quality as they are of in inflammatory gout in

the stomach, therefore those several inflammations affecting the head, lungs, pleura, abdominal viscera, and the different extremities, are owing to an acid existing originally in the constitution; as that because acids are thrown off by vomiting in gouty inflammations of the stomach, the gout is, in those different parts affected with gouty inflammation, also caused by an acid originally in the habit, a thing which appears improbable if not impossible. I am therefore convinced that the ejection of acids from the stomach, when that organ is affected by the gout, is no more a proof of acids being the causes of the gout than of their being the causes of any of the diseases above named; and that the superabundant production of the acids in the stomach, when it is affected by the gout, is the effect of the inflammation upon the organs of digestion, just as much as it is in those diseases above recited, and not the cause of the gout, any more than it is the cause of any of them.

As it is by no means unconnected with our subject I beg leave to make some remarks on the green colour, and quantity of bilious matter ejected, in the gout in the stomach, and the other diseases,* in which this circumstance takes place.

* Some remarks of the same tendency as these, are, from the author's conviction of their connection with the treatment of that disease, inserted in his treatise upon Marsh Remittent Fever.

It is a very common observation, that the patient has vomited a large quantity of green poraceous bile in such and such diseases; and a supposition from this symptom arises, that this is the offending matter in the stomach and intestines, and the cause of the disease; and therefore its evacuation is absolutely necessary, and if it was completely effected, the disease, would soon give way; upon this ground, repeated emetics and cathartics are given. I will take upon me to say that this is but too frequently a very erroneous opinion, and the practice founded upon it also erroneous: because this very poraceous bilious vomiting is merely the effect, and not the cause of the disease.

To make this opinion clear, it is necessary to observe that the quantity of bile secreted from this liver in twenty-four hours by a person in health, is estimated by Hallar and others to be between 20 and 24 ounces in a middle sized man. But this natural secretion may be increased by various causes, as irritation, compression, &c. a common emetic will wonderfully increase the secretion, and what is thrown off the stomach is mostly secreted by the action of the emetic, during its operation; although it is commonly supposed to be collected there before the medicine was taken: some morbid stimuli will increase the secretion more. But the bile thus prematurely or precipitately secreted has no bad quality

in itself, it is indeed rather thinner and less active than cystic bile, and is rendered offensive only by mixtures of other fluids it meets with. And perhaps one of the offensive mixtures is the acid, whose quality from its superabundant quantity, it is unable to correct. All acids are known to change bile to a green colour, and the stronger the acid is, and the larger quantity there is of it in the mixture with the bile, the deeper is the green; I have frequently seen it so deep as to appear black. But the acid here is by no means an admixture that will produce putrefaction, on the contrary it will retard it, and its only fault here is its predominant abundance, which the bile has not a sufficient power to correct, by its alkalescent saponaceous property: and therefore it still keeps acting as an acrid stimulus on the secretory organs, so as to force a larger secretion, and create an unnecessary waste of this fluid: which waste, I am strongly of opinion, is one cause, of the sudden prostration of strength, in many diseases accompanied by vomiting.

In the marsh remittent fever, we sometimes find that spontaneous vomiting takes place, which will often free the patient of the disease, in the course of twenty-four hours. This is a great proof that the marsh miasmata, the causes of this fever are swallowed, and descend into the stomach with the saliva; and if the patient has the good fortune to bring up

all this matter entangled in the mucus which he vomits, he thus gets rid of the disease. But if this is not effected, by this spontaneous effort of nature, the digestive powers are impaired, a redundant acid is the consequence, and the miasmata act as stimuli to promote an increased secretion of bile, while the acid changes its colour to green after its secretion. The mischiefs which then ensue are repeated vomitings and ejections by stool, and, from the stimuli and absorption, fresh exacerbations of fever follow. In this process we have now the ineffectual efforts of nature to get rid of the original offending causes of the disease, the march miasmata in the primæ viæ, but it is now too late ; the poison is absorbed into the system, and nature again makes efforts to discharge it by the pores of the skin. The practitioner, observing that a vast quantity of green bile, mixed with other offensive juices is thrown off by these evacuations, is sometimes deceived by such appearances into an opinion that this bile (from the quantity thus thrown off, the disease has obtained the name of billious fever) is the cause of this disease ; and therefore to cure it, that it is necessary to get rid of this matter. With this view he accordingly continues repeatedly to accelerate both evacuations, in his patient, I believe erroneously ; because the stimulus of the operating medicines he takes, as well

as the mechanical effect of the operation, will increase the secretion of the bile, and, consequently, the quantity of that very offending matter, which he supposes to be the cause of the disease : wherefore instead of removing it, he will certainly increase the mischief, which, if he does not stop his hand, may help to sink his patient to the verge of the grave, which experience has taught us is more readily prevented after the absorption of the poison has taken place, by an early and liberal use of wine and peruvian bark, than by any other means. An emetic first, and a cathartic afterwards, certainly ought to be employed in the beginning, in imitation of nature, with a view to expel the miasmata from the alimentary tube : but if the fever appears again, the miasmata are most probably absorbed, and are now out of the reach of these medicines ; and therefore they are not only useless but hurtful, and repeated evacuations from their continued use, must evidently, from the above state of the matter, do mischief.

So necessary does bile seem to be to the process of digestion and nutrition, that if, by the liver's being obstructed, it is not secreted in due quantity, the body is not nourished, wastes, and soon becomes diseased ; the juices become vapid, the vessels torpid, dropsy, and other diseases ensue, which end in atrophy and death, unless the obstruction is re-

moved and digestion restored. In wounds of the gall bladder, the patient dies in a few days, I believe from the waste of the bile discharged from the wound. If the bile was an excrementitious fluid this waste would no more endanger life, than the waste of urine in wounds of its reservoir, the urinary bladder, and every one knows, that after lithotomy the edges of the wound sometimes become callous, and an incurable fistula often remains, communicating with the bladder, through which the urine constantly drains for many years, without the patient's life being in danger from this circumstance. I must indeed confess there is a difference in wounds of the gall bladder and those of the urinary bladder, which must increase the danger of the former, which is this; the gall bladder is placed high in the abdomen, and the bile may for that reason be liable to escape into that cavity, and by being more acrid than the natural abdominal fluid, may inflame the viscera and peritoneum, and, by an additional disease, increase the danger and hasten the catastrophe. Wounds in the bladder from lithotomy are not so liable to this misfortune, except the higher operation, because they are depending; the urine therefore is less liable to dislodge and inflame the contents of the pelvis: although this sometimes does happen, and proves mortal. It is, from what has

been said of this matter, pretty evident, that bile is necessary to digestion, and the formation of chyle; and the want of it, either from obstructions of the liver, or the waste of it from any cause, will produce diseases, which will endanger life, from the injury the digestion sustains from this want.

Moreover, if we consider that the liver is the largest conglomerate gland in the body; its situation at the upper part of the abdomen, contiguous to the stomach; the singularity of its structure, having not only its proper arteries and veins for its support like other glands; but another solitary large arterial vein, like no other in the body, the vena portarum, ramifying through its substance, whose ramifications enter every single glandule that contributes to compose the conglomerate structure of the liver, and are supposed to be the only congeries of vessels in this viscus, provided by nature for the purpose of conveying the blood loaded with the bilious fluid, to be separated from it by those strainers; and that from these glandules distinct ramifications of excretory ducts proceed, conveying the bile thus secreted, which uniting at last form the large hepatic duct: if we consider that curious receptacle for the bile, thus separated from the liver, the gall bladder, so different from every other in the body, having only one orifice and one tube call-

ed the cystic duct, proceeding from that orifice, through which both the entrance of the bile into the gall bladder and its exit from it are performed; which duct uniting with the hepatic, form the ductus communis choledochus, which entering the duodenum not far from the pylorus, conveys the bile into this upper extremity of the intestinal tube, in no less quantity than from 20 to 24 ounces in twenty-four hours: if we also consider the alkalescent saponaceous solvent, and assimilating properties which the bile possesses out of the body, we cannot suppose that all this wonderful apparatus was contrived only for the mere purpose of separating and discharging an excrementitious fluid from the blood. From these circumstances we may therefore conclude that the bile was certainly intended for very important purposes; and that its entering the intestine so near the pylorus must be for promoting the solution and assimilation of the alimentary matters in the small guts, of essential use in chylification. Were it merely excrementitious one would have supposed that its exit lower would have been more ready for exclusion than where it is, and attended with less inconvenience than in the duodenum.

I ought to apologise for detaining you on a subject (the bile) which, at first sight, might appear to have no relation to the principal object of your inquiry; I

am however by no means of that opinion; for, when the gout attacks the stomach and liver, and prevents digestion and nutrition, it becomes an object of serious magnitude, and requires all the light which investigation can throw upon it, therefore you will readily forgive the intrusion of this digression, as it certainly has a strong relation to our subject.

To return then from my digression, we may presume, from what has been said, respecting the acid fluid rejected by vomiting when the stomach is attacked by the gout, that it will appear that the acid is not the cause but the effect of the disease: and upon this ground the necessity will be evinced of promoting the evacuation of this acrid matter, thus generated, and of diluting and blunting the acrimony of what may remain, that it may not irritate this sensible and irritable organ now under the influence of the gouty inflammation, and increase the malady. This seems to be best done by promoting the vomiting, with warm water, barley water, gruel, or any other soft beverage, which, if it does not return by vomiting, may dilute and render inoffensive what acid crudity may remain, and when the vomiting does cease, the acidity may be effectually destroyed by the addition of a small portion of fixed alkaline salt to the diluting drink: after which the exhibit-

on of proper anodyne and other remedies will prove more efficacious.

From all that has been advanced it seems to be evident that a pure acid cannot exist in the circulating fluids, and therefore, that it is impossible for an acid salt, a supposed cause of the gout, to be deposited from the blood, on the joints of a gouty person, and for that reason the tophaceous concretions cannot originate from that cause. Indeed the very concretions, or as they are called, chalk stones, found there, contradict this opinion in the strongest manner ; for they are found to be alkaline earths, and dissolve entirely in acids.

LETTER III.

Dear Sir,

The next in order in the catalogue is wine, in which article I shall beg leave to include hard drinking.

3. Acid austere wine, upon the same principle that acids do not produce the original cause of the gout, ~~is~~ not I believe² predisposing cause of that distemper in a sound constitution. Excess however in the use of any vinous liquor, by exciting an unusual stimulus, may, like any other stimulus, bring the latent matter of a gouty constitution into action, and produce a paroxysm. But I cannot allow even drinking wine in excess, to be the primary cause of the origin of this disease, in a constitution otherwise sound ; for the following reasons.

The number of inhabitants in this town is estimated at near 12000 ; perhaps three or four hundred of them are wine drinkers ; that is some constantly and others occasionally so. There are not in the town that I can find, upon strict examination, more than 39 or 40 people afflicted with the gout,

and these are of all ranks in life from the gentleman to the porter. None of these arthritics are hard drinkers, and some of them of the lowest class seldom or never taste wine; their beverage being generally beer. Three of the gentlemen are abstemious men, both in the articles of food and drink, and although they constantly use wine in a moderate way, were never known by any of their acquaintance to be intoxicated. I have moreover to observe that in forty years' practice, I have seldom known a hard drinker afflicted with the gout!—We have gouty drinkers here it is certain, but not above one or two, and there is sufficient evidence that the disease descended to them from their parents. By hard drinkers I mean those who are drinking from morning till night, and are seldom sober; but keep perpetually heated with liquor, and are often intoxicated for days, I may say weeks in succession. Their days are generally shortened by this excessive intemperance, and phrenitis, paraphenitis or hepatitis, puts a speedy period to their existence, or a more lingering yet premature death is brought on by the constant stimulus destroying the tone of the alimentary canal, which bringing on obstructions of the liver and all the glandular system of the chylopoetic viscera, consequent jaundice and dropsy finish the catastrophe, without a single symptom of gout making its appearance.

A gentleman, a very near relation of mine, became a hard drinker long after he was attacked by gout. The gout did not kill him, he fell a victim to dropsy brought on by this kind of intemperance, and, upon opening his body, five gallons and upwards of water were discharged from the abdomen; the liver was schirrous, and weighed nine pounds; the pancreas, spleen, and in short the glandulous system of the whole abdomical viscera were enlarged and obstructed. This happened in an early period of my life, but I have seen many similar instances since that time.

From these facts we are in some measure authorised to infer that wine, even acid wine, is not a predisposing cause of the gout. But that an excess, sitting up late at night employed in hard drinking, with accidental cold when heated with liquor, may so far derange the system in a gouty constitution as to produce a fit, by thus rousing the dormant gouty matter into action.

4. Premature and excessive venery shall come next under consideration, as a supposed predisposing cause of gout. How this came into the catalogue I know not; I must however differ from the authors of this opinion, because, it appears to bring on very different diseases. By it the constitution is enervated and debilitated, the vis vitæ is exhausted,

paralysis, tabes dorsalis, and atrophy ensue, and death frequently brings up the rear of this species of intemperance. I have seen an instance of a young man losing his sight, and becoming totally blind by it. He recovered it is true, but by very slow degrees and with the greatest difficulty. Yet he had no symptom of gout, nor did I ever hear that he ever had any.

The gout on the contrary does not appear to be the child of a debilitated or enervated system. It generally comes on in a full habit, and firm tone of fibres; is, in its acute state, which I believe to be always the case, or with a very few exceptions indeed, attended with inflammatory symptoms, often of the very highest kind. The gout does not appear till about, or after, the middle age: though it must be owned that some few exceptions are to be found: I know one person who had it at twelve and another at fourteen years of age, the latter of whom became afterwards a miserable cripple: but both of these evidently had the disease by descent. We may from the above considerations fairly conclude that venery is not a predisposing cause of the gout, and that the opinion that it is so is not founded on fact.

5. Contagion is among the original causes of gout mentioned by Boerhaave; and his commentator,

Vanswieten, is at some pains to point out the probability of it by adducing instances of distempers becoming contagious which were not naturally so; and the dysentery is mentioned, which is a simple disease in the beginning, but becomes highly contagious in the end. But people conversant in the diseases of fleets and armies, know, that the contagion of this disease, and fevers, depends on particular circumstances and situations; that the vapour of putrid animal matter from the privies is the principal source of infection, among the sick soldiers and sailors; and the air contaminated by human effluvia, in crowded camps, hospitals and ships: and that human effluvia in apartments filled with the sick will not only produce the gaol, hospital, or ship fever, from the most simple beginning, but dysentery: which are certainly very different diseases from the gout.

I shall not follow Vanswieten through the strange stories which he has adduced from Helmont and others in proof of the gout's being a contagious disease. I shall only say that they furnish tokens of a credulity which degrades the learned commentator. The only apology we can make for him is—“*interdum bonus dormitat Homerus.*”

The peculiar smell, which I shall hereafter notice, emitted with the perspiration from the diseased limb

on the resolution of the gouty paroxysm, might lead to a supposition that these effluvia contained miasms of the disease of an infectious nature, capable of propagating the gout by contagion; but experience, I believe, proves the contrary. I am convinced of it from having seen a great number of miserably crippled arthritics with chalk stones, ulcers, &c. in the course of my medical life, and some now, are immediately under my eye of twenty five and thirty years' standing: but I never knew a single instance of a wife, who was constant in her attendance on her husband day and night, nor of any other attendant or member of the family, ever receiving gout by infection from the diseased person. Yet surely, in circumstances like these, were it contagious, the infection must operate, and, in a town with a large number of inhabitants, where many families live in confined yards, and several under the same roof, it must soon become general. On the contrary we have at most 40 arthritics in near 12000 inhabitants in this town, and therefore I cannot think the gout contagious, and believe that it is generally true, that no hereditary disease is so.

6. Irregularities of every kind; 7. unnecessary exposure to inclement weather; 8. violent and fatiguing exercise, particularly on horseback in cold and wet weather. These with others will certainly

act as occasional exciting causes of a paroxysm in a gouty constitution, and really do so. But we may truly venture to say never did so in a sound constitution. This will appear evident from experience and observation, if we consider that there are no men in active life but are exposed to some irregularities, to the vicissitudes of weather in inclement seasons, and indeed all seasons: many to severe and fatiguing exercise, in every season. For instance seamen who live very often on but indifferent provisions, in which a large proportion of salted animal food, of not always the best kind, enters. They cannot be called temperate men, but are exposed to as many vicissitudes in the articles of meat and drink as in those of the weather which they combat; and are generally known to drink freely, or rather excessively, whenever they have it in their power. Yet a very small proportion of those men we observe afflicted with the gout: perhaps not one in 1000 or we may possibly say thrice that number. Here then we may find irregularities of eating, drinking, and every other kind, with exposure to every variety of weather; yet the gout is produced but in an insignificant number, and perhaps if in those the origin of it were traced, it might be referred to an original leaven from hereditary descent.

To these we may add the labouring husbandman,

who perhaps does not eat so much animal food as the sailor. His diet consists generally of fat bacon and coarse fare, and when he has it in his power, he will not resist often the temptation to get drunk; he however is inured to hard labour, and the vicissitudes of weather, and perhaps as few of his class are subject to the gout in its acute form as of the other, yet they sometimes have symptoms of chronic gout.

The next we may notice are the working mechanics of every denomination. They are in their different occupations exposed to hard labour, some to the vicissitudes of weather, many to gross food, and many are addicted to hard drinking occasionally: yet very few of these men are subject to the gout.

Lastly I will name the gentlemen sportsmen, the sedulous followers of the field diversions of hunting, shooting, and coursing; among whom I shall include the gentlemen farmers and farmers of a lower order, who, besides the vicissitudes of weather they experience in their necessary business, endure them in the pursuit of field diversions. These people are less or more exposed to all kinds of weather, and every species of intemperance: yet a very trifling number of them we find subject to the gout, and in those it can easily be deduced from a hereditary origin.

If these causes therefore were actually productive

of the original gout in the constitution, every man exposed to them would be more or less afflicted with it; the contrary of which daily experience evinces.

9. Violent affections of the mind from anger, terror, grief, or any sudden misfortune or distress. These repeated causes will occasion a paroxysm. A sudden shock from any unforeseen distressing accident, I know from experience, will produce a fit of the gout. But this can only happen in a constitution impregnated with the original leaven conveyed by descent. For if these were really original causes of the first generation of the gout, in an otherwise sound constitution, every human being, male or female, upon the face of the earth, would be subject to the gout, as all, one time or other, are exposed to the vicissitudes of those several passions. Therefore this cannot be true.

10. Intense study. Sydenham in his "Letter to Dr. Short," (Swan's Trans. Pag. 462.) tells him, that an immediate application to a large work on the gout and dropsy, which he was composing, occasioned the severest fit of the gout he ever had, and that, as often as he returned to this study, the gout recurred, which made him abandon it and consult his health, and content himself with the short essay he had written, to which his Letter is prefixed.

Sydenham was terribly afflicted with the gout, and an unusual exertion of mind, in a habit so charged with the disease, by this application might excite the action of the gouty matter, and occasion a paroxysm: and the same thing may happen to other people. Nothing of this kind ever happened to me: on the contrary I can apply closer and with more attention to a subject, and discuss it with more clearness and recollection in a state of convalescence after a fit of the gout than at any time. But, however that may be, it cannot be concluded that, because intense study excites a fit, it must lay the original foundation of the gout, in any sound constitution. Were it so, every studious man in the world would be liable to the gout, the contrary of which is well known.

11. It would be useless to run through the whole of Boerhaave's list, most of the articles of which are founded on mere speculation and conjecture. He reckons eating asparagus as one cause of the gout, as also fat bacon. Vanswieten tells us in his commentary on this aphorism, that the subputrid peculiar smell which asparagus communicates to the urine after it has been eaten, shows it to be a very penetrating substance; he however acknowledges that it may be eaten in large quantities by men of sound constitutions, without any injury: yet in

gouty people it had sometimes been observed that a copious use of it brought on a fit; and asks, whether by its penetrating virtue it does not move and bring into action the hitherto dormant morbid matter? he says that Trallicanus condemns cabbage, cresses, rocket, leeks and garlic, as inimical to the constitution in this disease, and that these occasion a different smell in the urine. I have not sufficient experience to decide in these matters. It strikes me however that boiled beef and boiled mutton very soon convey a peculiar smell to the urine; and food of this kind, and many other substances may as well be condemned upon this ground, as those above named. For my own part I eat freely of asparagus, cabbage, beef, mutton, &c. and hitherto with impunity, and when a fit does come on it must be from some other cause, as it generally happens when asparagus is not to be had. I therefore believe this opinion to be without foundation.

Upon the same ground many other substances may be said to produce the gout, because they are active and penetrating; as most of the tribe of diuretic medicines, in particular all the turpentine, from whatever origin; whether in the form of gross turpentine, burnt turpentine known by the name of tar, resins, balsams, or essential, or distilled, oils: all which convey a violet smell to the urine, whether

taken inwardly or applied externally. Even the effluvia of them are known to produce that effect, as every one must have experienced who has remained any time in a new painted room, where Ol. Terebinth had been used in the colour: but as it will appear in the sequel that the kidneys are employed as one of the outlets of the gouty matter, in the decline of a paroxysm, it is reasonable to suppose that those remedies which promote the secretion of urine, would rather conduce by expelling a large portion of the offending matter, to relieve the patient, than to bring on a fit.

12. Debility—from its latin origin, means no other than weakness, feebleness, decay of strength. It can mean no other in a medical sense. To suppose that the gout originates in the system from debility seems to be contradicted by common experience. The gout generally attacks men of strength and vigour, in the prime of life, with firm fibres and a full habit, and it is with them a truly phlogistic or inflammatory disease. Men of this description cannot be said to be in a state of weakness, feebleness, or debility. After the inflammation abates, the intense pain gives place to a real debility, in the part affected chiefly, but by consent in some degree in the whole habit. This appears manifestly to be the effect of the disease. The action

of the gouty matter seems first to have produced the paroxysm with great inflammation, and after that has abated, to act as a sedative poison on the nervous system, and bring on debility. This must be obvious to every observer, as must also be the increase of this debility, by the repeated irritation of the cause of the disease, after every paroxysm, as people advance in life. To suppose debility, then, to be a cause of the gout, is to suppose cause and effect the same thing.

13. Some have lately supposed that the gout originates in an otherwise sound constitution, free from suspicion of any hereditary cause, from the poisons of arsenic and lead, which, to the disgrace of humanity, are used, for certain purposes, in wine, by the manufacturers of that otherwise wholesome beverage. It is however well known that many abstemious people, who very seldom taste wine, are dreadfully afflicted with the gout, whilst ninety nine wine bibbers out of a hundred (or we may go much farther) and hard drinkers too, are never afflicted with it; therefore this cause requires no refutation.

It is not my purpose to enter into a discrimination of the well known deleterious powers of these minerals. It may be however observed en passant that arsenic and lead will produce the palsy. We know that several mechanics use arsenic in their dif-

ferent occupations, without being afflicted with the gout; some few of these and manufacturers of lead, plumbers and painters, are afflicted with it, but not in a greater proportion than other people; and if these poisons, particularly lead, would produce the gout, a great majority of these artists would be afflicted with it, which is not the case.

14. Others have added to the catalogue, strains and bruises, as exciting causes of the gout. It would be inconsistent to suppose that those external injuries would lay the foundation of the gout in a sound constitution: since if that were the case no one could be safe. We find that in sound constitutions with regard to gout, these injuries produce but temporary maladies, and seldom, unless extremely violent, amount to simple inflammation; therefore to consider them as original or proximate causes of the gout must be injudicious. But we know that external injuries will produce a fit in a gouty constitution. For instance the sudden application of cold, particularly to the extremities; blows, hurts, bruises near the joints, producing acute pain the instant they are inflicted, wounds, sprains, &c. are frequently sure to produce a paroxysm out of the common course. I have twice had a severe fit brought on immediately, by falling accidentally with my foot under me; twice by sitting up all night in

my professional duty in a room with a brick floor, although there was a good fire in it; and once by sitting only during the time of dinner, on a cool day in summer, with my feet on a painted patent floor cloth, over a boarded floor, in a room where there was no fire. It struck a chilness through my whole frame as if my feet had been placed uncovered suddenly on a cold marble slab. And I have had frequent relapses by being obliged to travel in cold, wet, or snowy weather, in attending my professional avocations. I have known a blow on the elbow, the fall of an inconsiderable weight on the joints of the foot, a sash window upon the fingers, and many other accidental injuries, bring on a fit of the gout directly, and, exclusive of the temporary mischief, superinduce a thickness in the ligaments, a total lameness, and sometimes chalk stones have appeared near the injured joints.

From a retrospective view of what has been offered, it seems to appear that the only original, or, if you will, proximate cause of the gout, in an otherwise apparently sound constitution, is hereditary descent: that all the rest are secondary, occasional, or remote causes, and can only produce a fit; and that the application of any extraordinary specific stimulus, whether from within the system or from without, will derange the *economia animalis*.

lis of an arthritic, excite the latent gout into action, and bring on a paroxysm, even out of the course of what is commonly supposed to be the time for the regular periodical returns of the disease, in either spring or autumn. This consequence will not however always be the case: and the powers of the constitution, by the exertion of some particular and unknown process, are often able to avert the mischief. Thus we see that every fit of intemperance, every instance of grief or terror, every application to intense study, or any thing that the mind is anxiously employed on, every violent exercise, application of cold or external injury, will not constantly produce a paroxysm of the gout; although these causes frequently do produce this effect; but the natural resources of the habit have very often powers unknown to us of getting the better of those stimuli, without a fit of the gout being the consequence.

Different authors have given different divisions of the gout, which it will be unnecessary to take up your time with here.—A very respectable one, Dr. Cullen, divides it into the regular and irregular, and the latter into atonic, retrocedent, and misplaced. Perhaps it may be more simple to divide this disease into two kinds only, the *Acute* and the *Chronic Gout*; because, agreeably to the different phenomena, the several gradations, if I may so term them,

between the highly inflammatory acute state of it, and the lowest debilitated chronic state, the two extremes of the disease, involving all the irregularities of it, may be readily comprehended.

It must be remembered that the gout is a disease of the whole system ; and although the extremities are first affected, in its acute form, every part of the body, from its continuance, is liable to be attacked whilst that form lasts, with inflammatory symptoms. And we can easily conceive that the inflammatory diathesis does gradually lessen, as the powers of nature become weakened, by the repetitions of the paroxysms, and the concomitant decline of life ; that this lessening of the inflammatory diathesis will continue in proportion to the increasing debility of the system, from these causes ; and all the intermediate symptoms of gout, with ineffectual inflammatory powers, may seize different parts of the body, and have the appearance of retrocession or being misplaced, although, in fact, it may be the real progression of the disease, excited to act in different parts, according to the quantity of it, and the power applied. In course of time the debilitated system becomes so weakened, and the efforts gradually so feeble, that the natural powers can do no more in the inflammatory form, and then it may be presumed that the chronic form of the disease begins, and spasms in-

duced in this state are ineffectual in throwing it off.

Hence we may conceive that as the gout is an affection of the whole habit, from a hereditary labe, the morbid matter is diffused through the whole body; that it lies dormant until an adequate power, by a process we are entirely ignorant of, rouses it into action; that although the extremities are generally first affected as we know from experience, in some constitutions other parts are attacked before the extremities; and that, in an advanced period of life, with a concomitant quantity of the disease, different parts are indiscriminately affected; the feet or hands no more than the knees, thighs, ischia, loins, spine, shoulders, clavicles, sternum, &c. this has therefore been called wandering gout, probably with impropriety, as the cause was present in every part alike.

A living author* of great respectability, to whom medicine is much indebted, is of opinion that the gout is hereditary, and also believes that it may be acquired. He is at much pains to prove that it is not owing to a fluid morbidic matter descending from father to son: but supposes it to arise, as a disease of the whole system, from a general conformation of the body; yet says that the general state of the system depends on the state of its primary moving powers, therefore the gout is an affection of these, and chiefly of the nerves. This is briefly the sum

* Professor Cullen.

of his theory respecting its hereditary origin. I leave you to consult his arguments against the existence of a morbid fluid cause of the gout, at your leisure, and shall only observe that the most rigid sceptic will not deny that the rudiments of every living being were originally in a fluid state; that the constituent principles upon which the formation, organization, nutriment and increase of the foetus depend, existed first in the blood of the parents: and we can no more discover the different materials upon which those different processes in the body depend, by any examination or analyzation of the blood, than we can the particles of morbid matter which we know have actually been conveyed into the blood, of both young and old subjects, and which do produce disease. And on the other side, that, upon dissecting the offspring of gouty parents, no difference in the texture and general conformation of parts, particularly those parts mostly affected with the gout in adults, has been discovered from those of other subjects, where there was no suspicion of a hereditary gouty leven in them. We do not find but men descended from gouty parents have their joints as wellformed, and are as athletic, vigorous, and active, before they are attacked by the gout, as those whose parents never had the gout themselves, nor any suspicion of its being in their constitution, by

descent, from their forefathers. We find that the difference which appears afterwards in the articulations of gouty people, is, beyond a doubt, owing to the consequences arising from repeated paroxysms of the gout, and has nothing to do with the author's general position, in regard to the general conformation of the body, as hereditary from father to son; but is the effect and not the cause of the disease.

The sum of this Professor's pathology of the gout amounts to this: he supposes—that a plethoric and vigorous system in some, at a certain time of life, causes atony in the extremities; that this is in some measure communicated to the whole system, but chiefly to the stomach. That if the energy of the brain and nerves is still as great as ever, the *vis medicatrix naturæ* is excited to restore the tone of the parts, and accomplishes it, by exciting an inflammatory affection in some part of the extremities, which, subsisting some days, the tone of the extremities is restored, and the patient returns to his ordinary state of health.

This ingenious hypothesis is liable to objections.—If by *some*, is meant people of a hereditary gouty constitution, and this manœuvre of the *vis medicatrix naturæ*, is merely introduced to account for the production of a paroxysm, this machinery is alto-

gether unnecessary : because a plethoric habit is not absolutely required to excite a fit ; any stimulus, even blows or hurts on or near the joints, in gouty constitutions where no plethora exists, are from experience found to be sufficiently competent to this purpose.

Plethora is supposed to cause different inflammatory diseases, and it may bring on the gout in a hereditary gouty habit. But if he means here that this supposed manœuvre of nature is to produce what he calls acquired gout in an otherwise sound habit, we have already, in the examination of different supposed existing causes of the gout, said so much on the improbability of its being produced in any other way but from descent, that we must have better proofs than mere opinion or bare assertion before we can accede to this hypothesis.

“ The inflammation, subsisting some days, is supposed to restore the tone of the extremities, and the patient returns to his ordinary state of health.”

Were this really so, we should have no gouty cripples ! For, according to this hypothesis, the inflammation excited in the extremities, supposed to be in an atonic state, produces a reaction of the vessels, which, by these means, recover their tone, and become better able to perform their functions than they were before the fit. This supposed atony how-

ever, at this period, is much to be doubted ; because I apprehend it is not supported by experience. I know many who appear to be more alert and active, have greater flexibility in their joints, and more strength and agility in their limbs, immediately before a paroxysm than at any other time. I am one of the number, and have constantly experienced this for many years ; and from this very circumstance know to a certainty when a fit is near at hand. People of this description, in which may be included the vigorous and plethoric, cannot be said to have any appearance of greater debility, or, in other words, atony, or want of action, in their extremities before the fit, than at any other time ; indeed it is notorious that instead of the wonted health and vigour being restored, a real atony is produced by the fit, this atony progressively increases with every paroxysm, the functions of the parts are gradually impaired, and decrepitude, in a greater or less degree, becomes the consequence.

I perfectly agree with this author that the nerves are the media through which this whole intricate business is transacted : for, as the whole system is conceived to be impregnated with the gouty original cause, the nerves ought to possess at least their proportional quantity. As their extreme sensibility renders them first susceptible of irritation,

being diffused so fully through the system, they become readily obnoxious to be affected by every stimulus: the application of which rouses them immediately, and that portion of the gouty matter, which they possess, may be supposed to be thus developed, diffused, and brought into action, and to bring on a paroxysm. This seems to be most conspicuously evident in the gout brought on by an external injury. As I do not however pretend to know any thing of the secret operations of nature, I only allege the probability of this being the case from what is evident to the senses.

The irregularities of retrocession, translation, &c. of the gout, are supposed by this author to arise from an alternation of the action of the external with the internal parts: but I, who suppose that there exists a real morbid fluid which possesses the whole system, apprehend it to be more probable that these phenomena are only variations of the disease, in perhaps a natural progression, by the application of the stimulating cause to that part which is attacked: for that no solids can act, in the animal body, without the introduction and circulation of the fluids through them is pretty certain. Whatever stimulus, therefore, external agents may give, to produce spasm in the living fibre, the internal fluids, I conceive, must have a large share in the business, both as to the

production and continuation of the symptoms of this disease, and that the probability of such a fluid agent, of a very subtile nature, in mixture with the constituent parts of our system, does actually exist, I trust will appear in the sequel, not from the plausibility of conjecture only, but on the more certain ground of being obvious to sense.

LETTER IV.

Dear Sir,

Having endeavoured in my former letters, to show, from a sketch of what is known respecting the formation of the human foetus, &c. on what ground I had formed my opinion, that the only cause of the origination of the gout in the human frame, is hereditary descent: and that the alleged causes thereof to be found in authors, from an examination of the principal of them, are nothing more than occasional or accidental stimuli, which, in certain circumstances excite the dormant gouty matter into action, and thereby produce a paroxysm: and indeed some of them I conceive not even equal to have this effect: it will now, my friend, naturally occur to you, that some inquiry should be made into the nature of this morbid matter, so often mentioned by authors, and repeatedly named in my letters.

This inquiry will be a very difficult task, and will prove, I believe, a medical problem, which never may be solved. This matter is of two subtile a nature to be collected in a separate state, and free from mix-

ture with other adventitious adjuncts, so as to be the subject of accurate investigation: nor, were a quantity in the gross mixture to be collected, can it be separated from its grosser parts, so as to show the pure gouty matter in its original, I may say, ethereal, fluid state, by any chemical process that I know: nor, if this could be done, do I think it would answer any beneficial purpose, either as to the investigation of its real nature, whilst it is in the system, or, to the pointing out any method of curing the disease: at least I do not find, that the resolution of any animal matters into their constituent principles, by chemical analysis, has been of any manifest utility either in the prevention or cure of diseases, or in explaining the nature of any one distemper. Any one of the constituent principles must be extremely different in its properties, when thus separated, to what it was in the aggregate mass in the living body.—You may perhaps say, “it is a query if the *mat. morb. prodagræ* be animal matter?” If it is not, it certainly is nearly allied to it, as we know not of its existence any where but in an animal body. I have said it is a fluid, and in this I am countenanced by almost every one who has written on the subject. I shall however pass over in silence that mass of conjectures to be found in authors; and offer, in proof that it is a fluid of a

very subtle nature, some facts that are obvious to every one's senses. But before I enter upon this discussion, it will be necessary to mention some circumstances, which happen on the resolution of a gouty paroxysm, which may help to throw some light on this very intricate and curious subject.

When the inflammatory stage is at the height, a tumefaction of the parts affected commences, whether the seat of the distemper be in the foot or in any other articulation; which is greater or less in proportion to the violence of the symptoms, and probably the quantity of the disease. For the sake of perspicuity let us consider the foot, because the progress is more particularly and distinctly marked there, than any where else, in a regular paroxysm.

When the tumefaction of the foot takes place, the pain begins to abate, and gradually lessens until it ceases, at which period the foot is much swollen: but the concomitant inflammation ends with the pain. It is difficult to investigate the cause of this singular fact, but as I have attended to it with great solicitude for many years, I shall attempt some explanation of it, which I will give you as it strikes me.

The swelling of the foot appears manifestly to be owing to the infiltration of a fluid, into that connecting medium, the tela cellulosa, surrounding the

parts affected, that part of it I chiefly mean which contains little or no adipose or oily matter, and even into the cavities of the articulations, and mucous sacs in the neighbourhood of such articulations, where they are seated. This however is more evident in the mucous sac under the insertion of the rectus muscle into the patella, than any where about the foot. This infiltration, so far as I have been able to judge by inspection, is at first mostly limpid and colourless: but afterwards, by the evaporation of the finer parts, it becomes more inspissated and opaque.

That this is the cause of the swelling appears evident, by its subsiding on a fluid's being discharged, by any outlet on or near the part, either from a spontaneous crack in the skin from the great distention, or the application of a blister. I have often emptied the cellular membrane, and reduced the swelling by blisters, in less than twenty-four hours, the discharge being always great and of long continuance, if the cuticle was removed.

The first cause of this collection and infiltration of a fluid, is, in all probability, that particular derangement, which must take place in the absorbent system, in the parts affected, whilst they are under the influence of the gouty inflammation, which must render it impossible for this wonderful process

in nature to be carried on with regularity. By the action of the heart and arteries, increased by the gouty inflammatory fever, the inhaling arteries will continue to pour their fluids into the cavities, whilst the power of the absorbing lymphatics is wholly suspended, their orifices being shut by being involved in the disease.

Although this may afford a plausible reason for the cause of the swelling, it, by no means, accounts for the cessation of pain, which so speedily takes place at this period. From a careful attention to my own feelings, I am led to conjecture, it may be this.

About the height of the inflammatory stage of the gout in the feet, when the pain and spasm are dreadful, the coats of the vena saphena and of the ramifications of it upon the foot are so exceedingly inflamed and painful, that they cannot bear the slightest touch; and the whole of the ramifications on the parts affected, appear exceedingly turgid, black, and obstructed, as if the blood was stagnant in them. Whilst the capillary extremities of them are in such a state, is it not probable, that they may be so contracted, as to prevent the blood from the capillary extremities of the arteries from entering them, as in the ordinary course of the circulation? by which an obstruction is formed to the passage of the blood in those vessels. The blood then being thus

denied admittance, whilst, at the same time, the influx of it receives a stronger impulse from the increased action of the heart and large arteries, excited by nature to overcome the resistance met with in the capillary extremities, those capillaries must be so much distended that they are ready to burst ; and would actually do so if their orifices did not give way, and allow the fluids to pass in greater abundance than when the natural secretion of the usual limpid form, in the process of secretion and absorption, is duly performed, in the cells of the tela cellulosa and every other cavity in an animal body. The fluids which thus find their way are mingled, most certainly, with morbid particles of gouty matter, although they are mostly forced in the colour of serum from the finer arterial orifices, into the cavities above named ; or else, in the state of red blood, either through orifices of a larger diameter, or a rupture in the vessels themselves. One of those circumstances must sometimes take place, as it is not uncommon to see large extravasations in the tumefied part at this period, several instances of which I have seen, on the tops of both feet at the same time, in the form of a large ecchymosis, on each of them, like that occasioned by a contusion, but much blacker, and they were many weeks longer in dispersing than ecchymoses produced by external violence generally are.

The violent distention of the obstructed capillary arteries above named, must occasion great pain, and, in all probability, must be one of the leading causes of that dreadful pain and spasm so distressing to arthritic sufferers, at the period immediately preceding the tumefaction of the foot : and the relaxation which must take place after the capillaries find this exit for their contents, whether in the form of serum or blood, may be part of the cause of the relief afforded to these terrible symptoms, when the swelling is produced by the infiltration or extravasation of blood or serum, in the manner abovementioned. At the same time that this process is going on, the pain in the coats of the ramifications of the venal system and other inflamed tendinous or nervous parts, will, in all probability, disappear with the resolution of the inflammation, beginning about this period to take place.*

We now, my friend, come to that period of the paroxysm, when it is about to resolve, and then it

* This may afford a plausible reason for the symptoms above related : but what can account for that peculiar shifting and transitory pain, which so often takes place in gouty invalids ? I do not mean that pain which moves from joint to joint, in a regular progression of a paroxysm ; where, for instance, the gout seizes the foot on one side, then the knee, and moves from thence to the knee and foot on the other side ; or from foot to foot and knee to knee ; all which are so common in a fit of the gout : but that instantaneous darting pain, which strikes without warning, and springs like an electric shock from place to place : sometimes rapid, sometimes slower, in its progression, with little or no acceleration of pulse, and little or no in-

is that the existence of the gouty fluid is rendered obvious to our senses.

When the tumefaction of the foot is arrived at its height, the parched cuticle cracks, and a sweat begins to issue from the pores of the skin. At this period the pain is abated and the inflammation begins to resolve. This discharge from the pores is accompanied with a very peculiar fœtor, which is the first and strongest proof, that is obvious to the senses, of the existence of the genuine gouty fluid. This smell is *sui generis*, and like no other existing

inflammatory heat; and after shifting for some time from place to place, seems to affect one spot more than the rest, which is generally in the vicinity of some lymphatic glands, and here a puffy trifling swelling appears. The seat of these singular pains seems sometimes to be in the tendinous fasciæ, which is spread over the muscles, immediately under the adipose membrane, in most parts of the body; but is particularly distressing, on those expansions which cover the loins and os sacrum; and the periosteum of the bones of the thighs and legs seem to my feelings chiefly affected; from this it seems to affect, in a distressing manner, the ligaments of the joints and the tendinous insertions of the muscles; although those parts have been supposed by Haller and others to be void of sensation: and the lymphatic glands in the neighbourhood, particularly those seated between the flexor tendons of the leg at the back of the articulation of the knees, and from them darts along the lymphatics. The nervous system, in those parts, is affected, in a wonderfully distressing manner, with excruciating torture, particularly on the least alteration of posture. The cause of this evidently cannot be a gross agent, but seems to be one as subtile and active as the nervous influence itself; but in what manner it does act, is a mystery I believe beyond the reach of human wisdom to discover. All that inexplicable chain of malady here recited, I have repeatedly experienced in the course of my arthritic life.

in nature. It strikes the olfactory nerves of gouty people themselves in a singular and forcible manner, but much more so does it those of the attendants and bystanders. In every critical evacuation by sweat in fevers, rheumatisms, &c. there is some smell, and in those diseases the smell is pretty much alike, but very different from the smell of the perspiration of a gouty person, at the resolution of the paroxysm, which is most readily distinguished from all others on the face of the earth. Philosophy teaches us that odours of every kind, depend on effluvia of a fluid nature, ascending from odoriferous bodies, in very minute particles: whether the bodies are aromatics or foetids, in concreted masses or a liquid form, makes no difference, the odoriferous particles are diffused through the circumambient air, and most probably are in a state of solution in it. These gouty effluvia are certainly very minute particles, and sufficiently evince the presence of an exceeding subtile, I may say, ethereal fluid, escaping in the form of vapour, mixed with the sweat of the diseased limb, and whilst part of it mingles with the surrounding atmosphere, a much greater part, mixed with the sweat, is absorbed by the bedcloths, &c. and impregnates these so much that it is long before it leaves them, even after the fit is over. In proportion as this fluid escapes, the symptoms abate,

the swelling subsides, and the extravasated fluid, its cuse, gradually lessens from the absorption being restored to the lymphatics, in cavities of the cellular texture: and of course the general secretions, and therefore the reduction of the swelling of the foot keeps pace with the quantity of the discharge by the pores of the skin. The decrease of the smell accompanies the decrease of the swelling, until the foot returns to its natural size or nearly so; but this last circumstance only takes place after a few of the first fits of the gout, because the coats of the vessels become thickened, and the ligaments, &c. about the joints enlarged in every succeeding fit, in a few years after the first attack, and gradually increase as people advance in life. This seems to be owing to the inspissation of the extravasated fluid, at least the residuum of it, if I may so call it: for the fluid, which was at first thin, and after the inflammation first abates, begins to be taken up by absorbent lymphatics, is probably thickened by heat; and partly from its morbid state, perhaps cannot be all taken up, the most watery parts of it alone being capable of entering the mouths of the lymphatics. For secreted lymph, in a healthy state, was found of different thicknesses by Hewson, according as the animals were nourished on which his experiments were tried; those that were less nourished having

more water and less of that part of it which is coagulable, and those that were more nourished more of the coagulable part and less water. As the most watery part is the most readily absorbed, we may suppose it is soonest taken up in the diseased state of the gouty limb above described, and most probably the coagulable lymph is the latest, and having the admixture of some gross adventitious earthy matter hereafter to be noticed, it is easy to conceive that it may by the addition of heat be so much inspissated as not to be capable of being absorbed into the system: and being retained, may lay the foundation for that decrepitude which afterwards in general takes place in those unfortunate people who have a large quantity of the disease entailed upon them: for as age advances, there seems to be an accumulation of disease, and the dimensions of the parts involved in the succeeding fits, as before observed, gradually enlarge, their natural functions are impaired, and the articulations lose their freedom in motion: indeed some of the small ones become actually ankylosed.

When the foot is reduced as far as it can, and the freedom of the joints restored; in short, when the paroxysm is completely ended; then it is that the odour leaves the part affected, no longer accompanies the sensible perspiration, and does not appear

again during the intervals of the paroxysms. The very singular smell arising with the sweat from the diseased parts only as above mentioned, is sufficient alone to evince the existence of the gouty fluid. But there are other circumstances in the course of the disease, by which this fluid is developed, rendered obvious to the sense of smelling, and its existence further established. The first of these I shall take notice of is not indeed the effect of a natural but an artificial operation: which is after the application of blisters. The same peculiar odour accompanies the discharge from the vesicated part, after the cuticle is removed, which attended the evacuation by sweat from the diseased foot, and is undoubtedly part of the *materia morbifica propria* of the gout escaping that way, which shall be farther noticed in the treatment of the disease.

The next instance of its being developed and rendered obvious to the senses is, the same smell attending the collections of calcarious earth deposited in the cellular texture about the joints and other parts of the gouty limb, so frequently met with in all consistences, from that of a milk like fluid to that of a solid concreted mass, in the advanced periods of life and the accumulated load of disease, which force their way through the skin, forming very troublesome ulcers. The discharge from ulcers of this

sort is generally called gouty matter. Part of it certainly is so, as the smell evinces, but the recrement, solid, earthy, matter is not so, it is pretty evident; for as the fit goes off the thinner parts are discharged, and the grosser are often left, when it is perfectly over, a mere concrete, inert earth, totally soluble in acids, without that peculiar fœtor attending the other.

The gouty fluid appears by its action on the nervous system to be a kind of sedative poison: for it is wonderful what a distressing debility it leaves behind it, if even the inflammatory stage has not lasted above twelve hours, a debility which is long in going off, and, from the frequent repetition of the paroxysm, continues in the intervals more or less, through the remainder of the arthritic's life.

We may from these premises, my friend, without much hesitation, affirm, that there is a subtile fluid matter, *sui generis*, concomitant with the exit of a gouty paroxysm, and I apprehend it will not be any presumption to believe that this is really the morbid matter of the gout. This then being granted, at least to ourselves, observation has extended this object still farther; for from hence we learn that there are some peculiarities or particular circumstances, which lead to a conjecture that this gouty matter has a power of increasing in quantity and extend-

ing its distressing influence as we advance in life. What this may be owing to I confess is beyond my comprehension; the fact however is so, indisputably; and whether this fluid has the power of some other ferments of assimilating other fluids of the body to its own nature and thereby increasing the quantity of the disease, I shall not take upon me to determine. However that may be, observation proves that the frequency and length of duration of the paroxysms, gradually increase as we advance in life, and atony, and a gradual accumulation of the quantity of the disease, keep pace with them; that calcarious concretions are only concomitants of the disease, with its accumulations, at an advanced period of life; and that at length gout, under these circumstances, takes so entirely possession of the frame, that the symptoms of it, in some instances, never totally leave the patient. There is scarcely any interval between the paroxysms, unless a partial remission of pain may be called so; there is indeed a partial resolution of the swellings of the joints, but the rigidity of the parts, and debility increase, and the miserable arthritic is never twenty four hours without pain: chalk stones, and ulcerations in consequence of them, appear, and the poor cripple is just enabled to crawl from the bed to the couch, and from the couch to the bed again.

This however is not the lot of every arthritic, but it is the lot of many; and as the calcarious concretions at this period are the most distressing circumstances, let us inquire into their cause. These calcarious collections, whether in a fluid or a concrete state, although vulgarly called gouty matter, I have already observed are not altogether so. It is indeed evident from the smell, that this subtile agent is certainly present in the admixture, but the grosser adjuncts have by many degrees the largest share in the compound, and indeed these last appear rather to be an effect than the cause of the disease. Calcarious concretions are undoubtedly to be met with in many parts of the body, and probably, when examined, may have nearly the same properties, but those in question are always confined to the same parts, and their formation in those parts in a gouty constitution, and no other, evidently marks them to be the effects of the disease.

Let us try to develop the origin of them.

Bones are known to be of a fibrous reticular structure, of a cartilaginous, elastic, and flexible nature; and an earthy or cretaceous matter fills up the interstices, and gives them solidity and stability. This has been discovered by experiment, and the cretaceous matter is soluble entirely in acids. Anatomists have availed themselves of this knowledge,

and by destroying the earth by acids have further developed their texture by boiling them in turpentine varnishes, by which they become transparent, and the ramifications of injected blood vessels running through them are rendered visible. You cannot have forgotten the many beautiful preparations of this kind in the possession of that excellent anatomist, the late Dr. Hunter.

Baron Vanswieten gives so good an account of this curious subject from Baron Haller and others, that I shall take the liberty to add the following abstract of it.

“ The illustrious Haller, by an uncommon industry, discovered in the newly created animal the formation of the bones, and although he modestly offers his opinion as conjecture, he relates what he actually saw. He observed that the whole body of the beginning animal, bones and all, was composed of a soft gluten, that this gluten, which formed the basis of the bones, changed first into cartilage and then into bone : that the change of the gluten into cartilage was rapid and easy ; as it only seemed to acquire more solidity : but that the alteration of this cartilage into bone was a much slower, and more obscure operation : that the cartilage was at first pellucid, and that the signs of its turning bone were an opacity and yellowish colour. At this period its

fibrous texture began to appear. On the eighth day of incubation this change was perceived. On the tenth day the rudiments of blood, distinguished by a yellow colour, appeared : on the eleventh day it was red and that part of the cartilage which began to be opaque and yellow on the eighth day reddened on the eleventh, the arteries being so much dilated that the globules of red blood could pass and in their place the bony hardness was perceived at the same time to have taken place in the cartilage : this circumstance appears also on the callus of fractured bones, before the same is consolidated : the increasing arteries press more and more on the neighbouring parts, they become firmer whilst they are dilated by the blood, and more capable of transmitting the thicker parts ; first the earth, which, being insinuated into the cartilaginous substance, gives it hardness and fragility, diminishes its flexibility, and hence, from a flexible, elastic, cartilage, a hard and brittle bone is generated. When the acid of vinegar, unites with this earth, a neutral salt with splendid, shining, crystals is formed, the bones become at the same time soft, and return to their cartilaginous state again.

This earth appears to be perfectly soluble in acids. Storck macerated the bones of fowls in aquæ fortis diluted with water, by which they were rendered

flexible and elastic. An addition of al. tart. per deliq. to this solution, occasioned a precipitation, which being collected and washed, proved to be a mere earth. He then immersed a skull, which had been many years in a cemetery, in a dilution of aq. fort. in water, which by these means became flexible and elastic.

Madder seems to act only on the earthy part of bones, and imparts to it its red colour. It, for that reason, does not tinge cartilages, unless they ossify, nor the callus uniting broken bones, before it begins to acquire the nature of bone.

A cartilage therefore differs from bone only because it wants this cretaceous or earthy matter, and if this earth is taken away by macerating the bone in acids, it then becomes cartilage again: as if indeed the cartilage lay concealed in the bone, and was thus developed.

If bones tintured with madder are macerated in acids, the tophaceous, coloured, earth is dissolved, the colour is destroyed, and the cartilaginous part remains in no degree tintured by the colouring matter. Herissant observed, that tophaceous, gouty, concretions dissolved entirely in the nitrous acid, and that neither cartilage nor membrane was left; that also, in an old hen, who had concretions of this sort about her toes, it was observed that after the

use of the Rub. Tinctor. the concretions were deeply tinged with a red colour, and wholly dissolved in the diluted nitrous acid. From these experiments it is confirmed that it is the cretaceous or earthy part of the bones, which receives the tinge from the Rub. Tinctor. and that as the gouty concretions consist wholly of this earth, they are therefore more impregnated with the colour than the bones themselves. If here it be considered that the solid parts undergo perpetually an abrasion or waste by the vital actions in perfect health, it must be requisite that there be a constant restitution of lost parts that health may be preserved.

It appears from many experiments instituted by the celebrated Du Hamel, and confirmed by others, that if the madder root be added to the food of animals the bones will be tinged of a red colour. If afterwards these animals are fed without madder the part of the bone which grows during this period will not be tintured: but if they are again fed with madder, the red colour will appear. Du Hamel found the thigh bone of a hog, cut transversely which had been fed in this manner, variegated alternately with circles of red and white. It was observed that when the animal was fed with madder for the space of a month, a part of the bone of a remarkable thickness, was tinged of a red colour. And as

it was before demonstrated that the earthy part of the bone is alone tintured with madder, it shows that, in the space of a month, a considerable quantity of cretaceous earth is furnished, partly to repair the loss sustained by abrasion, and partly towards the increment of the bone; those experiment being made on the younger animals. And he demonstrated by experiment that if the animal was afterwards nourished by his common food, without the addition of madder, in six weeks the red colour entirely vanished: because, whilst the earthy matter of the bone (which had been tinged) was carried off during this period, its place was supplied by a similar substance, but not at all tintured with a red colour. From hence it may be concluded that this earthy matter is separated from the bones, that this separated part passes out of the body by the usual outlets by which the useless parts are commonly discharged; but at the same time (whilst this process is going forward) that there is furnished by the proper vessels, not only a supply for the waste, but, also, for the growth, of the bones required in the young animals.

If therefore, the vessels are so changed by repeated attacks of the gout, the fabric of the bones may be so injured that the matter destined for repairing the waste of them, is denied entrance to the usual

place. It does not seem extraordinary that this matter should be deposited in the neighbourhood of them, and constitute the gouty concretions; and from what has been said before, it appears evident that the chalky, gouty, concretions have the same qualities, which are found in the earthy substance of the bones; which earth, added to cartilage, renders the cartilage, bone: therefore, when that, which ought to be employed in repairing the bone, is collected in the cavities of the articulations, incurable anchyloses are produced: if it should possess the ligaments, it takes away their flexibility, insomuch that their motion is destroyed, and the shape of the parts deformed in a surprising manner."

Thus far I have followed the illustrious Baron Vanswieten, and have now to remind you that the experiments which he has adduced have been repeated with the same results by eminent anatomists in this country, and, if I am not mistaken, Mr. John Hunter stands foremost in the list of those philosophers who fed hogs with madder, and confirmed all Du Hamel's experiments, by which it is proved that the bones are composed of a fibrous, cartilaginous matter, and a cretaceous earth: for although we may suppose the fibrous, cartilaginous matter must suffer some abrasion in the general course of constant waste and renewal of animal

parts, in a state of health, this waste is not so obvious to the senses; and it appears, that the cretaceous earth is the matter that is principally and largely carried off, in this natural process, and most abundantly renewed to restore the waste of parts, in a state of health.

Hence the Baron concludes, that as the vessels in the vicinity of the joints are contracted in their dimensions by gouty causes, this cretaceous matter, although in a dilute state, may be detained in its passage, and form the tophaceous concretions so frequently distressing to the gouty patient.

LETTER V.

Dear Sir,

Baron Vanswieten's is a plausible theory of the formation of gouty concretions, commonly called chalk stones. My conjectures on this subject lead me to deduce their origin from the same cause, the cretaceous matter of the bones; but the modern discoveries in chemistry have induced me to consider the process of their collection and deposition on the injured parts in another point of view, which whether erroneous or not I give you as follows.

It being evident that it is essentially necessary for our existence that the bones, as well as other parts of the human body, should be furnished with materials for their nutrition and increment in young subjects, and nutrition, and a supply to recruit the abraded parts, in the adult, it is plain that these osseous, or rather osteogeneous, materials, must be in a state of perfect solution to be carried through the course of circulation, and we may readily suppose

that this solution must constantly exist in the thinner parts of the blood. Now this solid matter must have some medium by which it is held in solution in a watery fluid. That there is such a medium actually existing in our constitution in large quantities, is most certain, not in an acid state, but in various combinations with different substances of an alkaline nature. This medium is the aerial acid, more commonly called fixed air; because it is found, in a fixed state, to contribute to the weight and composition of many bodies, and, when let loose from these bodies, is discovered to be an acid, volatile, vapour, or permanently elastic fluid, with many properties similar to common air. This acid fluid readily unites with water, and modern chemists have discovered that the most solid matters, metals, chalk, marble, and every other kind of calcarious earth, are held in a state of solution in water impregnated with fixed air, and that, by agitation, more fixed air is absorbed by the water, and more calcarious earth, or other matters, may be taken up and dissolved in the fluid; and that this power of keeping the solid matters in a state of solution, in water thus impregnated with fixed air is, in proportion to the quantity of aerial acid in it and the quantity and continuance of the motion. For it has been found by experiment that water, thus impregnated, when

left in a state of rest, soon becomes decompounded. The aerial acid is volatile, flies off by heat from the water, a heat even not greater than that of the common atmosphere, and although heavier than atmospheric air, it easily mixes with it by a kind of solution ; of course it will leave the earth, with which it was combined, in a state of solution in the water, the fluid will become turbid, and the earth will precipitate to the bottom of the vessel. The greater the heat is the sooner the decomposition takes place, but heat will not so readily produce this whilst the fluid is kept in agitation, particularly in close vessels; but this evanescent principle will escape in the open air. Upon the presence of the aerial acid, in water, depends the impregnation of the mineral waters of Seltzer, Pyrmont, Spa, &c. with the different materials of which they are compounded ; it is what gives them the sparkling briskness and agreeable subacid taste, and is that which escapes when these waters become effete and lose their virtues, and the other component parts, viz. iron, calcarious earth, &c. precipitate. It is upon the escape of this principle in calcarious waters, that the incrustations of stony matters, or half petrification of vegetable substances and real petrification, depend.

There is great probability that, by means of waters impregnated with calcarious earth, which are

exceedingly common in all marly and chalky soils, a portion of this calcarious earth is introduced into the habit by the constant use of these waters, and may help to furnish some part of the materials for the cretaceous matter of the bones, as well as that furnished by our nutriment.

From the recruit and decay which the system is perpetually undergoing, it is evident that it may suffer either from a defect or superabundance of the different materials furnished from the aliment, for nutriment and the restitution of wasted parts abraded in the constant course of circulation, to the different parts; and the bones as well as soft parts must be greatly affected by these processes of nature, and suffer remarkable vicissitudes. Facts have evinced this, and the cretaceous earth, which gives the bones stability, is proved, from the experiments before mentioned, to be the matter which is constantly changing: hence it requires no great stretch of imagination to suppose, that the instances upon record, of the bones having become flexible in adult subjects, might have arisen from a deficiency of supply of cretaceous matter to keep the firmness and solidity of their texture, whilst this matter was constantly carrying off by the emunctories; and there appears to be little doubt but the rickets in young children, where there is a softness and flexibility in

all the bones, in particular those of the extremities, an enlargement of the heads of the long bones, and the spongy texture of these and the cranium, is owing to the same cause, viz. a deficiency of the cretaceous matter to give stability and firmness to the bones. On the contrary that exostoses and preternatural ossifications must arise from a superabundance of the osseous matter thus furnished, particularly the cretaceous part of it.

It is evident, from the laws of the animal economy, that in adult subjects, where the bones have acquired their acme and utmost state of solidity, less will be required to repair the daily waste, and therefore the superfluous matter becoming useless must be excreted from the body by some outlet or other: for which purpose it must still be circulated with the fluids and still in a state of solution: and no one of the emunctories is better calculated for this excretion than the kidneys, which I believe to be more generally employed (if not chiefly) by nature, in this salutary office, than any of the other secretory organs.

You will readily, my friend, excuse me for troubling you with this preliminary digression on matters you are well acquainted with, because it is necessary to be kept in remembrance for explaining the hypothesis I am about to give you.

Having already shown that the swellings of the gouty limb, which commence at the height of the paroxysm and subside with its resolution, are caused by the infiltration of a fluid into the tela cellulosa, &c. I shall now hazard a conjecture on the cause of the formation of the tophaceous concretions; which is this.

As the earth of bones is held in a state of solution in the thinner parts of the fluids of the human body, is it not probable that part of this earth is dissolved, and mixed with this fluid, before mentioned, infiltrated into the tela cellulosa, cavities of the joints, &c. and being now out of the course of circulation, and in a quiescent state, the evanescent, aerial acid, the principle on which the solution (we suppose) depends, will leave the calcarious earth, to which the heat of the parts, and perhaps a greater elective attraction to some saline or other matter, may contribute,* a decomposition will take place,

* The ingenious Mr. Henry, of Manchester, and other modern chemists think that fixed air is a menstruum to the putrid effluvium. The gouty effluvia have a singular fœtor, which may perhaps depend upon a peculiar putridity in the system; at least the fœtor from the arthritic's breath, seems to indicate a certain degree of putrefaction in some of his fluids. It may be asked then, why may not the gouty matter attract the aerial acid? —Perhaps the volatile, gouty, matter is the substance that does (by a greater degree of affinity) attract it, and promote the decomposition of the fluid in the tela cellulosa, &c. now out of the course of circulation, and the fixed air, deserting the earth, leaves it to precipitate, while the new

and the earth will precipitate from the fluid in its earthy form, and be deposited in different consistencies in the cavities of the cellular texture, cavities of joints, and every other part where the fluid has been diffused in the diseased limb? For you know that the *tela cellulosa* enters into the texture and is the connecting medium of all parts, and abundantly so in those in which the tophaceous concretions are found: and although they are commonly deposited about the joints, I have known them every where as far as the disease extended. The whole *tela cellulosa* in both legs and feet of the late Mr. Andrew Pigge, an ingenious apothecary, in this town, from the knees to the toes, was filled with chalky matter, and appeared as full as if liquid mortar had been injected into the cells, and there left to harden by the evaporation of the water that suspended it, the whole appearing like a coat of broken hair mortar, under the skin. By continual accumulations, it had

combination of the aerial acid and gouty effluviuum may escape with the sweat from the pores of the skin, or the open ulcers which discharge chalky matter: for, we find, as the gouty fluid escapes, that the cretaceous matter from the ulcers has, according to the degrees of its spissitude, less or more of the arthritic smell, until, as before observed, it entirely leaves it. Some experiments might discover this; perhaps by collecting the sweat upon oiled silk, and adding it to lime water, the aerial acid, if present, might be detected.

made its way through the skin in a great many ulcerations, and hard and soft cretaceous matter was discharged from them many years before he died. He often had the gout in his viscera, and a fit seizing his stomach, at length finished the catastrophe, a vomiting of black, putrid, matter, indicating gangrene, ensued, which carried him off in forty eight hours.

It is highly probable that in some gouty constitutions, and perhaps it might be so in that of the gentleman above mentioned, collections of this earthy matter are deposited in many other parts besides the vicinity of the extremities. Dissection has discovered concretions of chalky or calcarious matter not only in the glands and cavities, but in every part where secretion and absorption are performed, in short wherever the cellular texture enters; and in many places ossifications take place at the same time in the same subject, which leads me to a presumption that these different states of those preternatural formations are dependent on the same cause; which we may infer is the redundant earth of the bones.

I shall take the liberty to mention some other instances, and first that of a gentleman known in London by the name of Whig Middleton, whose dissection is given by the ingenious Mr. Watson, in

the 1st Vol. of the Medical Commen: a brief abstract of which is as follows,

This gentleman died of the gout at the age of fifty. He was a free liver in early life, and so soon a martyr that he was an old man at forty. His last ten years were most uncomfortable. From a tall, active, well looking man, he lost all strength and vigour of mind, became emaciated, dejected, and his faculties impaired: was unable to lie straight in bed, his legs being contracted to his thighs, his thighs to his belly, and knees to his breast. He was in this state, when dissected.

The first joint of one great toe was cased in chalk, like a fossil shell, yet the bone was unaltered.

The joints of his fingers were swelled and knotty with chalk, and he was said to have scored his game with his knuckles when he played at cards.

There was an oblong tumour on the right tibia like a node, found to be a mere deposition of chalk, between the skin (which was thin and ready to burst) and the periosteum, which, although thick and large, had not injured the bone.

He complained often, a little before death, of excruciating pain in his head, with a sense of falling down headlong.

It was impossible after sawing, to remove the cranium without dividing the dura mater; which

seemed owing to an inflammation, thickening, and induration of that membrane: which accounted for the excruciating pains in his head, which distressed him often before death. The fosciculated texture near the sinusses was remarkably strong; the glands, as they are called, large and distinct; the brain itself, firm as wax: a large quantity of lymph like the clearest spring water was in the ventricles.

The pia mater was pale, with a sort of clear jelly deposited in the cellular membrane connecting its two lamellæ. Its outer surface was smeared with a smooth chalky mucus like cream.

The medulla oblongata and medulla spinalis were much firmer than the brain. The tunica arachnoides was thickened, harsh, and gritty. The glandula pinealis quite destroyed, nothing remaining but its membranous coats, filled with concretions resembling small pearls.

Although the body was emaciated, firm fat of two inches in thickness, was under the skin of the abdomen. The mesentery was so much loaded with fat, that two thirds of the circumference of the gut were invisible.

The stomach and guts were healthy although pale: the spleen and pancreas were sound; the liver was indurated, and of a pale yellow colour; the gall bladder was buried in fat, and contained a little pale and

watery bile: the abdominal portion of the aorta was ossified from the diaphragm to the iliac arteries.

The kidneys were small and filled with hydatids, and the external surface of the right kidney was almost covered with them. The urinary bladder was thick and contracted, little urine within its cavity, neither was there gravel, stone or chalk in it or in the kidneys.

The valves of the heart, the great vessels issuing from it, and the whole thoracic portion of the aorta were free from ossification. The lungs were soft and pretty healthy, excepting one small stone in one of the lobes; the bronchial glands accompanying the trachea were filled with gouty matter.

The rigid contraction of the lower limbs, was owing to the hardened and thickened state of the ligaments, which had lost their polished hue. The synovia was like a mixture of chalk, oil and water, and become thick as cream; the cartilages not altered.

From this examination Mr. Watson infers that gouty matter has the strongest tendency to the extremities, where the weaker impetus of the circulating fluids is most likely to leave it.

“Is it not remarkable (says he) that there were no marks of it in the hollow viscera: neither in the liver, kidneys, spleen nor pancreas?” He thinks it

pronouncing rather too much, that those subject to gouty concretions are subject to the stone, and vice versa ; because of all the lithotomy patients of every age and sex cut at the hospitals, few have the slightest indication of the gout. Gout and stone (he thinks) are morbid secretions, and may exist in the same subject, but differ essentially in their material principles and tendencies ; calculous matter is formed in the urinary passages ;—the gouty deposits itself on bones, cartilages, membranes, and lymphatic glands. Gouty seems to be a different earth from that of the urinary calculus : it never appears laminated, or to have formed a nucleus ; but is soft, white and uniform throughout ; may be dissolved and ground by the motion of the joints, mixes with the synovia forming a smooth creamy fluid.

Gouty earth is then a kind of greasy bole, easily made to mix with oil and water, which in general a calculus cannot do ; so that in every respect (says Mr. W.) colour, form and consistence, it seems to differ essentially from that which lays the foundation, and causes the increase of the stone.

Morgagni (*de causis et sedibus morborum* lib. iv. p. 277) gives an instance of a nun, about thirty, who had a tumour in one of her breasts, attended with much pain, which burst spontaneously. It was suspected to be cancerous, but the attending surgeon

was of a different opinion, which was confirmed by the event. From the opening during the treatment of the sore, he extracted a round body about the size of a walnut, which Morgagni found to be composed of pieces of bone of different dimensions, as if they had been broken asunder, placed in no regular order, but connected together by the interposition of a ligamentous like substance, which, on drying, became black but the bony fragments preserved their white colour.

He tells us likewise of a cartilaginous substance found in one of the mammæ of a bitch he dissected, calcarious granulæ in the membranes of her lungs, calculi in both kidneys, which were otherwise diseased.

He also in the same page gives an instance of a learned gentleman, who in the thirty first year of his age, had a small glandular knot appear on the upper part of his right breast, which in the space of a year increased to the size of a man's fist, but without any shew of malignity. This tumour about the beginning of 1742 (fourteen months after its first appearance) broke of itself, and under its covering of integuments and some fleshy fibres, nothing but calcarious matter, hard in some places soft in others, was discovered. In a consultation held on this case, the safety of extracting this matter was doubted:

because it was alleged, as the father and grandfather of this gentleman were severely afflicted with the gout, although he never had had any symptoms of it himself, but a short transient pain in each great toe, this was referred to a gouty origin, and it was therefore supposed that by removing the gouty matter which had taken possession of this place, there would be some hazard of diverting it to some other and more noble part. However, after all the learned arguments which Morgagni gives at large, and I forbear, as useless, he committed himself to the care of a surgeon entirely, who, regardless of all that had been urged, opened the tumour, removed the chalky substance, and cured the wound without any trouble or any ill consequence, evincing the futility of the fears of the learned gentlemen consulted.

LETTER VI.

Dear Sir,

In my last I gave you my hypothesis respecting the formation of cretaceous concretions in the gout. You are to observe, my friend, I give it you as a probable conjecture: whether I am right or wrong let time and experience determine. If right it may furnish a hint for affording relief, if wrong it can do no harm: however, upon the supposition that it may be right, I mean to institute a set of experiments with a view to discover a method of either preventing the formation of those concretions, or of dissolving and promoting their absorption into the system and their expulsion by the emunctories, after they are formed. There has been lately some relief, in the calculus in the kidneys and bladder, reaped from an exhibition of fixed air in what is called by the name of our much lamented friend, Bewley's mephitic water or julep, which you know is a perfect saturation of a solution of fixed alkali in water, by the aerial acid. I refer you to

what Dr. Falconer has said, in his appendix to Dr. Dobson's Commentary on fixed air, upon that subject. But there are two different opinions on the similarity or dissimilarity of the gouty calcarious earth and urinary calculi. You have seen what Mr. Watson says on this subject. As however the gouty concretions have been supposed by some respectable authors, to originate from the same cause as the calculi above named, and we suppose that the same agent has a very considerable share in both ; since it is not very foreign to our principal subject, let us make a few observations on the origin of the urinary calculus, and the relation it bears to gouty concretions.

It has been pretty generally supposed that few gouty people are free from calculous complaints, either in the shape of large or small stones in the kidneys or bladder. Sydenham, from I believe his own feelings, says that the gout breeds the stone in many subjects, in the kidneys. This, with the frequency with which both diseases have been met with, in the same subject, has perhaps led to this opinion; although I cannot assert from my own knowledge that they are always existing in the same subject at the same time : I must own I have often observed gravel and small calculi afflicting gouty patients.

One remarkable fact has forcibly struck me, I

speak from experience in myself and others; I have
seldom or never seen a paroxysm of both diseases
existing in the same subject at the same time. I
know a gouty subject who was habituated to a dis-
charge of red, sandy, gravel, many years before he
had the gout; particularly after travelling on horse
back: from which circumstance it appeared as if it did
not form altogether in the bladder, but came down
from the kidneys in that form; on these occasions its
detention in the urethra was frequently distressing.
After the gout attacked him, about two months be-
fore the return of the paroxysm the gravel left him;
during which period he felt very alert and active.
When the gout went off the gravel again returned,
and these alternations of disease continued for many
years; but as the gout increases in the violence and
duration of the paroxysms, the appearance of gravel
diminishes: yet from his painful sensations it seems
to me that all is not well about the kidneys. Hence
I presume to conjecture, that he who is afflicted
with a load of gout and a constant accumulation of
chalky depositions on the cellular texture, is less
liable to have gravel or stone; because the earthy
matter of bone is diverted another way: and perhaps
from this circumstance, a reason may be given why,
when the gout and gravel are met with in the same
person, the paroxysms of each distemper seem (at

least from my observation) to alternate each other in their attacks.

The urine of a healthy person is known to abound with an earthy matter; this appears evident from the concrete incrustations deposited on the bottom and sides of the vessel if it stands any time. Van-swieten gives a detail of Boerhaave's observations on the urine of a healthy person which afforded some curious phenomena: exhibiting the formation of these concretions.

For this purpose he chose the urine of a healthy man, in whose family there never was the smallest suspicion of the existence of a hereditary calculous labe, nor in himself had there ever been any sign of a latent calculus observed.—He put this urine discharged when the man was in full health, twelve hours after a copious meal, and most profound placid sleep, into a cylindrical glass vessel six inches long and about the diameter of the middle of the thumb. Whilst it continued warm, it was of a citrine colour, pellucid, and every where homogeneous, neither in the transparent bottom of the vessel, nor in any other place, could he discover by the assisance of the microscope the smallest particle of heterogeneous matter.

He placed this vessel in a degree of heat equal to 72 of Farenheit's Thermometer, in the open air, and

only covered the orifice with paper to keep out the dust.—In about a quarter of an hour he examined it with a microscope, when it appeared full of corpuscles like flocks of wool without any equal or polished surface, which corpuscles seemed to be agitated with rapidity backwards and forwards, equally moving upwards and downwards, so as to maintain a kind of equilibrium, ascending and descending by turns. A little after this something whitish appeared in the urine, with striæ like fat, resembling the appearance of spirit of wine poured into water before an intimate mixture takes place, this fatty matter was somewhat like eels, and whilst this new phenomenon was accurately examined by the microscope, clouds formed out of those fatty striæ, pendulous at first through the whole cylinder, which gradually receding from the sides of the vessel gathered together towards its axis: those floculi which before moved about, began to disappear, and were collected into the cloud:—which becoming thicker every minute, began to descend, and at length to settle within the distance of half an inch from the bottom of the vessel, and the upper part of the cloud rested within about one inch of the surface of the urine. All this cloud appeared by the assistance of the microscope to contain every where within and without, minute shining concreted

particles, and similar particles began to adhere to the sides and bottom of the vessel at the same time.

These particles, at first white, became reddish in half an hour; from hence they turned redder, and in two hours were of the same colour with that urinous sand, generally deposited on the sides and bottom of the vessel, in which urine is left a considerable time. Nevertheless these rudiments of nascent calculi remained enveloped in the cloud, and did not fall to the bottom of the vessel, but appeared suspended in the fluid in the form of a yellow cloud. By degrees however some of these particles increased in magnitude and fell to the bottom; and at the same time, several other molicles generated on the surface which was contiguous to the air, which by gently shaking the vessel fell also to the bottom. And these molicles on the sides of the vessel, also increased in bulk and in twenty four hours equalled mustard seed in size. These were of a rhomboidal figure, with the opposite angles obtuse and equal, intermixed with parallelopiped molicles, much redder in colour, and larger in size than the rest. Some square grains were interspersed but those were few in number.—None of these molicles generated in the cloud became so large as those which formed on the sides and bottom of the cylinder; and those sticking on the sides appeared to be composed of

six others similar in figure, by whose mutual adhesion the size was increased.

I shall leave you to follow Vanswieten through the conclusions he forms from this curious experiment, as it would be taking up too much of our time in this Letter. I shall only observe, that the most natural inference to be drawn from it is; that the urine of a healthy person, appears to be loaded with solid matters in a state of solution, when it is excreted: and these matters seem to be earth salt, and other animal matters, which, on the decomposition of the mixture by, I suppose, the escape of the volatile principle, by the means of which the fluid held them in a state of solution, the solid particles thus let loose, attract each other and form new combinations in a crystalline form, which lay the foundation of calculi. Therefore we may suppose that urinary calculi are formed of the earthy matter of the bones, salts, and abrasions of the soft parts, which having become effete and recementitious, are secreted from the blood as useless, and ordained by the laws of the animal economy, to be excreted by the urinary passages: and that this will always be the case when they are held in solution in a watery fluid.—The bladder being the reservoir of the urine secreted by the kidneys, very considerable quantities are very often detained there for many hours in a quiescent state: during

this time that principle, let it be fixed air or what it will, which held these solid, earthy, and other matters in a state of solution, may have time to separate from them and perhaps form some new combination, we guess it may be fixed air, because the urine is found by experiment to contain a great deal of that principle. We find however that there is certainly a decomposition takes place, that there is actually a separation of the component parts, and that the more solid precipitate, and by attracting each other, sand or gravel in smaller or larger masses are formed, and lay the foundation for calculi. That in healthy people this seldom happens, unless some foreign adventitious matter, should be met with in the bladder, which may form a nucleus, to which the calculi may adhere.

Vanswieten observes that the sabulous concretions, arising as before related, in the urine of the most healthy men, was of a red colour, in some it was yellow, others ash coloured, white, and sometimes, though rarely, black: and adds, that some think, they are the worst kinds of calculi, which arise from sand of any other colour than red. He says calculi are formed by granulation or crystallization, not from different principles in the body or a confusion of humours, but by the application of similar elements.

It has I believe often been said, that red gravel never forms calculi: that this opinion is however erroneous, the following instance will prove, and many more no doubt have appeared.

A. C. a young woman aged 21, at Westwinch, in this neighbourhood, was cut for the stone in April, 1756, and a flat, oblong, brown stone near 3 inches long, $1\frac{1}{2}$ broad, and 1 thick, weighing two ounces and three quarters, was extracted: that end presenting to the urethra, was rounded off like the end of a flat potatoe, and was of a solid firm texture, the other was covered and elongated by means of an incrustation of transparent, beautiful crystals, very much resembling brown sugar candy; some of the crystals were large and others small, and seemed to be an addition endwise of a late formation, covering the other extremity of the solid, I may say primitive, stone, which seemed to have been blunted and rounded off like the other end, visible through the transparent crystalization, of the late creation. Those crystals were of different figures, as well as dimensions, some rhomboidal others square.

In the course of the cure stony incrustations from the urine which constantly drained off, formed daily upon the lips and edges of the wounded parts, which were not small, as the cutting gorget was used to divide the urethra: and the operator finding the incision too

small for the stone when in forceps, chose to cut upon it in the extraction to enlarge the aperture rather than lacerate the parts, as it was so large. —These incrustations sloughed off in the course of digestion, and hung in a chain together by the membranous parts in large quantities; but after the wounded parts healed so far that she could retain her water ten minutes or a quarter of an hour, and no urine passed involuntarily, no more crusts formed. She was perfectly well in less than two months, and although the great quantity of sabulous and stony concretions, which formed and were discharged during the cure, seemed to indicate a constitution very much disposed to the disease, she never afterwards had any symptoms of calculus.

Here we have an instance of not only red crystallizations forming the stone of the bladder, but even stony concretions forming on the wounded parts after the urine was out of the bladder. We have many instances of extraneous bodies forming nuclei for calculi, recorded in surgical writers, memoirs of societies, medical essays, &c. as for instance, ivory bodkins, needles, pieces of wood, &c. It would be impertinent to give you here a detail of them; Van-swieten has collected a number, and to him I refer you. I will however mention three extraordinary facts: two are experiments, and the other a blunder.

Nuck (*adenographia* p.) tells us that he inserted a small ball of wood into the bladder of a dog, through a wound made into it for that purpose, and proper care was taken of the wound. The animal seemed to be in pain two days, but his appetite and alacrity soon returned, the only disagreeable symptom remaining was a frequent irritation to make water. A few weeks afterwards, he dissected the dog before his pupils, and extracted the ball of wood, which appeared to be incrustated with calculous crystallizations, not unlike white sugar candy: hence he concludes, that a small calculus formed in the kidney, by descending into the bladder, may form the nucleus of a stone, which may by degrees increase to an enormous size; and also that, any extraneous body may form a nucleus; the truth of which as before observed is proved by the annals of medicine.

The blunder is thus related by Tulpius (*observationes medicæ* lib. iii. cap. 9.). A rash young man in hunting a buffalo in India, was gored by that animal, and his horn penetrated into his (the hunter's) bladder.—An incautious surgeon put a tent into the wound, without a thread affixed to it, the consequence was the tent slipped into the bladder. The wound however healed, but the patient was afflicted with a difficulty of making water, and pus

passed with his urine for some time: from hence he became afflicted with symptoms of the stone, and in process of time lithotomy was performed and a stone extracted the size of a man's fist; but of a friable texture, which had for its nucleus in the center, the tent which the surgeon had so carelessly let slip into the bladder. The young man, however, fortunately got well. Hence Tulpius takes occasion to warn surgeons, always to fasten threads to the dossils which they may be induced to apply to wounds in the cavities of the abdomen, thorax, &c.

The other experiment is one quoted from Mr. Sheldon's absorbent system and shall be related afterwards.

Preternatural ossifications have frequently been discovered by dissection to have formed, in the curvature of the aorta, valves and ventricles of the heart, in tendinous fasciæ and many other parts of the human body. Calculi of different textures, some friable either like sand or in larger concrete masses, others more compact, and more nearly resembling bone, are to be met with in every hollow viscus, and every cavity; I have seen the inner coat of the pericardium incrustated with a sabulous lining. The kidneys and bladder are the most common receptacles for them, even the veins and arteries are not exempted from their formation. But the ab-

sorbent system and lymphatic glands are more often affected; and the salivary glands, in whose excretory ducts calculi are frequently found: all which may be referred to the same origin, the earth of bones: to which also we may add those concretions deposited from the saliva on the teeth, forming hard incrustations upon them, which if suffered to grow too large are very inconvenient and troublesome. Vanswieten mentions an instance of a young woman who suffered these hard incrustations to increase from the dread of having them removed by an instrument, to such a degree that the teeth were buried totally under the frightful mass; which by pressing and ulcerating the gums, distressed the poor creature exceedingly and caused a very disagreeable fœtor. But the load, which was extremely hard, being removed by means of a steel chisel, and leaden mallet, in the hands of a dexterous and skilful surgeon, her mouth washed and cleaned, her teeth were cleared of the deformity and fœtor.

The deposition of this concretion on the teeth from the saliva, we may suppose to be much quicker in its formation than calculi any where else, the bladder and kidneys perhaps excepted; because the solution of the osseous earth secreted with the saliva, is more exposed to the air, which, with the heat of the mouth, will more speedily dispose the

aerial acid to escape, the decomposition to take place, and allow the earth thus separated, to be deposited from the saliva, and gather in the form of a thick fur on the teeth, but particularly about the roots, where the gum has left them and where the enamel does not reach, as if the naked, bony, part of the teeth, from containing the same materials, invited the adhesion of it ; and where it is soon consolidated into the stone like concretion.

The quickness of the formation of this calcarious (if I may so call it) incrustation on the teeth, appears the more evident, when we consider that the mastication of our food at meals, must abrade and carry off, great part of that already formed, as well as prevent the accumulation of it in hard masses : which with the pains that many people take to clean their teeth, renders it surprizing that this crust forms at all. Notwithstanding which, it forms so quickly that those ladies and gentleman, who are particularly nice about their teeth, are obliged to have frequent recourse to the dexterous hand of the surgeon dentist, to remove this extraneous covering. By which species of luxury, you know that the artists most in repute of this ingenious class of men, add considerably to their large income in London ; some I am told enjoying from their industry and reputation not less than one thousand, and from thence to upwards

of three thousand pounds per annum.—But the emolument arises to those great sums from the additional assistance of the other branches of their operative profession. The fair of both sexes, are not only obliged to the *raccommodeurs des dents*, for cleaning (called scaling) extracting, transplanting, ingrafting, &c. of teeth, but also to the ingenuity of these useful gentlemen, for supplying from the jaws of the Elephant, but more especially those of the Hippopotamus, the Sea Horse, (because the enamel of his teeth is thicker and harder, and of a purer white colour than ivory) the ravages of time committed on those useful and ornamental parts of the mouths of the beaux and belles in the fashionable world: giving as natural and youthful an appearance to those adventitious teeth, as the *Rouge* and *Blanc* gives to their complexions. Nature is said to do nothing in vain, it is therefore a query with me, whether, even this collection of incrustated earth on the decayed and exposed bony part of the teeth, although from a recrementitious origin, may not be designed, for their protection from the external air, and the prevention of their more speedy decay? You may, my friend, observe in old people almost a demonstration of this matter: an incrustation forming upon the surface of the decayed stumps which not only protects the nerve from the influence of the ex-

ternal air, but the angular points are covered and blunted by its accretion, the soft parts, viz. the cheeks and tongue prevented from being wounded, and so much firmness given to the stumps that they actually perform in a great degree the office of sound teeth in mastication !—This the dentists will say is a strange doctrine, can an excrementitious foetid matter like this be designed by nature to cover the teeth, which occasions foul breath, &c? It is not this earth that causes the putrid halitus, the gums are the principal seat of it, small ulcerations, there, discharge fluids liable to corrupt by the heat of the mouth, and send forth foetid effluvia ; yet this foetor frequently depends upon carious teeth and often upon injured lungs.—But the foetor attending large collections of this incrustation, will depend upon the injury the gums sustain by its extension, which irritating the softer texture of their edges will produce ulcerations and a discharge from them.

Large collections of this sort may always be prevented by a moderate use of sugar.—This calcarious matter is entirely soluble in acids, so is the enamel and earth of the bone of the teeth. They are therefore dangerous applications. But sugar you will say contains an acid, and it has always been observed that people addicted to an immoderate use of sweets, soon have their teeth destroyed :—sugar

therefore contains an acid on which this destruction depends.—This is certainly true in an immoderate use of sugar; and the acid of the sugar will actually dissolve this crust of adventitious calcarious matter and expose the uncovered part of teeth to the air, it will also attack the enamel, and upon these circumstances depends the injury which an immoderate use of sugar, always present in the mouth, occasions. But I know from experience that a moderate use of sugar, will have a contrary effect; a small piece of white sugar candy or even double refined loaf sugar dissolved in the mouth once or twice a day, will keep the breath sweet (as far as that depends on the teeth) and prevent the too great increase of this incrustation, that is, prevent its becoming either hurtful or inconvenient, and render the scaling of the teeth, as it is called, if not totally unnecessary, at least less necessary than is commonly imagined:—and will be found a far less injurious dentifrice, than many a composition that goes under that name, which generally contains a fossile acid material, of a far more active and destructive nature.

The ingenious Mr. Sheldon page 30 of his absorbent system, says that if a calculus be formed in the urinary bladder of an animal whose bones are coloured with madder (which can be effected by

the introduction of any extraneous substance into that organ),—the earth which composes the calculus will be of a red colour similar to that of the dyed bones. If we suspend for a time the feeding of the animal with madder and then feed him again with the same substance, and proceed alternately in this manner, upon cutting the stone through either in a perpendicular, or horizontal section, streaks of red will be found intermixed with others exhibiting the ordinary colour of the urinary calculus. *

This phenomenon cannot be otherwise explained than (he tells us) by supposing the earth of the bone to be absorbed by the lymphatics, and by them conveyed into the sanguiferous system, where, being secreted by the emulgent arteries from the blood with the earth of the urine, it is afterwards attracted by the nucleus introduced into the bladder. Some years ago, from observing some phenomena in the human body, the idea first suggested itself to me, (says Mr. S.) that the earth of the bone was continually changing by the deposition of new matter and absorption of old. † He had a conversation with

* Query.—Did Mr. Sheldon ever try this experiment? or is this an induction drawn from reasoning, by analogy, from the experiments of this kind on bones of animals? A matter of this importance ought to be cleared up.

† It seems to appear from this passage that Mr. Sheldon was totally ignorant of the many beautiful experiments in proof of this curious fact made by Herissant, Du Hamel, the French academicians, Haller, Storck?

Mr. J. Hunter who informed him, that he had fed himself with madder: I immediately (says Mr. S.) asked him, if the earth of his urine was tinged with madder? to which he answered, that the earth attracted by the sides of the vessel in which the urine was made, was of a red colour.† Vide Sheldon's absorbent system page 30. & 31.

I am informed that the ingenious Mr. J. Hunter, and some other physiologists are of opinion that the waste of the osseous, &c. matters, which require a perpetual renovation, is performed entirely by the absorbent system, and that this system has the power of absorbing the most solid parts of bone, carrying them into the course of the circulation, from whence they are secreted and expelled by the emunctories.—Mr. Sheldon, after mentioning the extraordinary case related by Mr. Cheston in the Philosophical Transactions, vol. 70, part 11, page 323, of the Thoracic duct of a man he dissected, being found entirely plugged up with ossific matter from immediately above the receptaculum chyli,—says, this is

&c. (mentioned in the extract from Vanswieten.) many years before he was a professional man: which is a little extraordinary in the writer of a system of absorption, and teacher of anatomy.

† The Earth in form of crystallized sand, deposited on the bottom, and attracted by the sides of the vessel in which urine is made, in different people, very often exhibits, a red, sometimes a pink colour, although no madder has been taken.

a proof of calcarious matter being absorbed, and found in the lymphatic system. There certainly is not a doubt of the fact, the question is was it in a state of diffusion and suspension in a divided form of minute, solid, particles in the chyle and lymph, or was it in a state of perfect solution in a fluid?— If the earth of bones is to be taken up in a solid form, from the bone itself, as by implication we may believe it supposed to be, as no other mode seems to to be hinted at, I must confess I am under much difficulty in being able to comprehend, the nature, indeed the possibility of such a process : it is giving a power to the mouths of lymphatics, of abrading, comminuting, and dividing this the most solid part of the body ; for which by their structure they are by no means adapted. There is no such thing as a solvent property given by those gentlemen to the fluids in the system, which may alone be capable of effecting this purpose. Although totally ignorant of the wonderful means which nature employs to remove the effete and useless parts of the solids in our system, I cannot think it possible, that such a process can be effected without the intervention of such a medium, or rather menstruum, as is able to reduce them to a perfect state of solution : and why may not this power reside in mixture with the finest part of the lymph ? It cannot be a comminution

of the solid matter and its mere suspension in the fluids ; because this could never pass the secretory organs without forming concretions every where by merely subsiding, as this earth must be specifically heavier than the fluid it is suspended in. Fine argillaceous earth, or any impalpable powder specifically heavier than water, is capable of remaining diffused through it and suspended in it whilst the fluid is in constant agitation ; yet the fluid is always turbid, and the particles of the powder are easily detected in it by a lens of a small magnifying power, or even the naked eye, and will immediately subside, when in a quiescent state.—Far different is this from the state of secreted fluids which hold the calcarious earth in solution ; upon their immediate secretion, they are limpid and diaphanous, and not a particle of earthy matter is to be seen in them by the best microscope till long after their secretion, and after a decomposition of their principles takes place : as already mentioned in Boerhaave's experiment.

Mr. J. Hunter in his Treatise on the venereal disease says (page 7.) that in ulcerative inflammation, the action of the absorbents superadded to the action of the arteries, will remove solid parts and even the arteries themselves.—What I should understand by this doctrine is, that the parts destroyed in the process of ulceration and digestion, are dis-

solved in the matter, and partly removed by it on the dressing, if the ulcer is external, or absorbed again into the system:—but perhaps this is not the author's meaning.

When bones are destroyed, they are, I believe, always exposed to the action of some fluid matter, which we may presume to have been the instrument of their destruction, and the most solid bones of the body have been known, to have lost their solidity and become porous and soft and even altogether dissolved under such circumstances. And that this has been the case whether the bone has been exposed to the action of blood, lymph, serum, sanies, or pus, without being subject to the influence of the external air is well known to every surgeon: and many instances of this kind are upon record in the annals of physic and surgery.—The destruction of the texture of carious bones thus exposed, and the softness they incur, seems to be owing to the loss of the calcarious or earthy matter, which appears to have been dissolved and carried off in a state of solution. It may be asked what is this solvent principle, which seems to be diffused in those several fluids, and has this peculiar property of uniformly producing the same effect, having a similar elective attraction to the earth of bones, and forwarding its dissolution in those different menstrua? In 1773, I sent an

account to the Philosophical Society of Edinburgh, of an encysted dropsy of the right thigh, with a dissolution of the bone, in a lady* who died tabid in 1767: as the case was a curious one I will give you a short abstract of what appeared on dissection.

The tumour was very large, of a pyriform shape, and extended from the spine of the ileum, and articulation of that bone with the os sacrum, possessing the whole thigh to within about three inches of the joint of the knee: on plunging a knife into it, about six quarts of a fluid were discharged, the first quart of which was yellow and without smell, the rest a bloody sanies. In opening the tumour by crucial incision, many ossifications in the soft parts were broken asunder before the knife would pass. It was now discovered that the fluid had been contained in a cyst, between whose thick coats, many preternatural ossifications of various shapes, thicknesses, and dimensions, uniting with one another, and forming a kind of reticular coat, of plates of bone, were every where spread. The muscles of the thigh were emaciated, and so united that distinction was lost, and appeared like a thin fleshy mem-

* The case of this lady is given at large in the Author's "Observations on Scrophulous Affections." page 95, &c. The above is merely an abstract of the dissection, inserted here to illustrate the opinion entertained in this work of the solvent principle contained in morbid animal fluids.

brane covering the cyst. A considerable quantity of white medullary like substance and seven or eight ounces of grumous blood, were deposited within the cavity, and its internal surface was studded with fungous, hemispherical excrescences of various dimensions.—But the most wonderful circumstance was that the whole solid os femoris was wanting from the acetabulum coxendicis to the lower end of the tumour: where its remains projected a small matter upwards, without any covering, into the cyst! three fourths of this solid bone being dissolved and annihilated. The acetabulum coxendicis had the upper and posterior part of its cartilaginous brim destroyed; there was a roughness at the bottom of it and a small ridge extended downwards through its cavity.—The remaining fragment of the femur was soft and yielding to the knife, of a dark blue inclining to black colour, its naked extremity was exposed to the action of the fluid in the cyst, its cavity was obliterated, and some plates of bone apparently of recent production, shot out from the edges of it fashioned to the shape of the cyst.

The operations of nature in this case are truly astonishing, here we see a total destruction and annihilation of some parts, and at the same time new combinations and arrangements in the formation of new ones; as if by these means she attempted to restore

a case of bone, to give some stability to the limb thus robbed of its bone by disease.

How is this very extraordinary business to be accounted for? was not the bone's texture destroyed by the action of the fluid? did not the fluid contain some principle, which rendered it a menstruum of adequate power to dissolve this solid bone? and if so, did not this solution enter the system by absorption? and was not the whole carried off by secretion? or does it appear more consonant to probability and the laws of Nature, that all this should be performed by the absorption of solid matter as before noticed? I shall leave you, my friend, to decide this question, I know what my own opinion is.

But whence came the origination of the new bony arrangements? I believe I must refer that to the supply of bony materials furnished daily from the aliment, and conjecture as there was no access to the space lately bone, they might be diverted to another situation and form bone in the parts where they were found: perhaps upon the same principle that ossifications are formed in the tendinous parts in old people, as the materials are not required in their bones.

LETTER VII.

Dear Sir,

I shall next come to the treatment of this very extraordinary distemper.

There is no disease incident to the human body, in the treatment of which there has been more whim, more caprice, and more quackery introduced than in the gout. This distemper being deemed an opprobrium medicorum, every one thinks he has a right (particularly in an age when quackery is rendered lawful, by raising a scanty revenue at the expense of population, and every smatterer and superficial reader pretends to more knowledge in medicine than the professors of it) to offer his opinion, and a method of curing this incurable distemper. Accordingly we have had a succession of nostrums obtruded on the world as infallible in the cure of the gout ; and the credulous arthritic prompted by his distressing feelings has grasped at the delusion and forwarded the interested views of successive impostors. Every one must remember the famous Le Fevre, who some

years ago gulled some people of distinction out of more than £5000, in a very short time, under pretence of an absolute cure, which he cunningly made them believe could not take place in less than a fifteen months' course of his powders: he received his money, and left the credulous patients to discover the cheat at their leisure. His patients appeared, I am told, somewhat relieved at first; but they soon found that the disease returned with aggravated symptoms, (as it was supposed to be an arsenical preparation it destroyed the remains of their debilitated constitutions) and many died victims to their credulity, and had their lives shortened by this dangerous experiment, as I have been credibly informed by several people concerned, and I have seen some of the victims myself. Yet I am told that this powder (if I am not mistaken) is sold under the name of the Liege medicine to this day. It would be endless to give you a catalogue of these healers of the gout, which would begin with that empiric, Paracelsus. It will be sufficient to notice that the credulous patient has always found himself disappointed, and that the gout has returned after the boasted cure was declared to have been performed, and the only certainty which remained after his delusion was the expense it cost him.

But in answer to this it may be said that there

are many undoubted testimonies upon record in proof of the gout's having been cured. One of these is the story which Hildanus relates (page 393) of a very ill tempered arthritic, who used to be continually reviling and calumniating his neighbours. A wag he had thus maltreated, took the opportunity, one evening when his attendants were absent to enter his chamber, blacked, and disguised like a negro, and approaching his bedside with a solemn pace, without uttering any answer to his questions, seized on his gouty hands in the height of a paroxysm, threw him on his back, and carried him in that manner below stairs, with his feet dragging on the stairs from step to step. When he arrived in the hall, he set him down terrified and speechless, on the pavement, and, retreating during his consternation, instantly disappeared. The arthritic who could not move a limb before, even upon plain ground, much less go up a stair, instantly found the use of his feet, and, fled with great agility above stairs, where, having gained his chamber, he alarmed all the neighbourhood by clamorously calling out at the window. When the neighbours came, they found him breathless and almost lifeless from fear. All he remembered was, that he had been pulled out of bed by a spectre, who carried him out of his chamber, and cruelly dragged him down the stairs ;

and that if he had not groaned out the name of Jesus he must have been destroyed. Every one was filled with astonishment, but especially at perceiving a person who, just before, had been deprived of the use of his limbs, able to escape up the stairs, and now standing upright before them. "What was the consequence? (says the writer to Hildanus) He perfectly recovered, and never afterwards was afflicted with the gout."

Credat Judeus appella—non ego.

That a violent agitation of the mind, from an attention to a particular object; for instance, when a person in a dangerous situation, requires immediate assistance, will suspend the pain of the gout, I well know from my own experience in more than one instance: and from an exertion of an energy of mind, by an attention to one distressing object, which engrossed all my faculties, I have from a cripple, been enabled to set my foot to the ground; in a short space of time, been capable of walking with the assistance of a stick only, and very soon after without it. I have more than once been sent for by patients in dangerous situations, when confined to my bed with the gout; with great torture have gotten up, and gone down the stairs, sitting on one and sliding from that to the next, till I arrived at the bottom. I have slidden along in this manner or been carried

to the chaise which was to convey me. I once particularly was thus circumstanced, being obliged to go a short journey to visit a patient; with much difficulty I was helped into the house: I immediately sat down on the bottom stair, and slipped up backwards step by step to the landing, which as my right foot was well I could do. I was helped into the chamber in extreme pain: but the idea of the lady's* danger, it being a midwifery case of an alarming kind, in an instant suspended my pain. The difficulty and danger of the state I found her in, immediately occurred to me; and my presence of mind was instantly exerted to relieve this lady in her perilous situation, in which I happily succeeded. In short this exertion of my mind suspended all pain, and in ten minutes or a quarter of an hour at most I was able to walk with ease about the room with a stick only, and very soon after, without it. I perfectly recovered from that time, but was not so fortunate as the subject of Hildanus's case, for my paroxysms still continue to return.

The same author, pag. 58. and 59. gives an instance where the torture had the same effect on another patient, that terror had in the case above related. A certain nobleman, afflicted with the gout,

* Mrs. Wm. F. of South Wootton,

being suspected of holding a correspondence with the enemy, was imprisoned and put to the rack, whilst under a paroxysm of the disease. He bore the torture with fortitude, and his innocence being manifested, he was set at liberty. To recover from the injury sustained from the torture, he went to the warm baths, where he was cured of the hurts he suffered by his cruel punishment, and his gout at the same time: and although eighteen years had elapsed since he was put to the torture, he never had the gout afterwards, but was as firm and erect upon his feet as any man of his age.

Happy would it be for gouty people if adventitious pain would always have the effect related by Hildanus of this nobleman, but unfortunately we poor arthritics find that sudden and continued application of cold, particularly to the extremities, blows, hurts, bruises near the joints producing excruciating pain the instant they are inflicted, sprains, &c. are frequently sure to bring on a fit of the gout out of the common course. The relation of these apparent facts of the gout's being thus cured by accidental causes is certain in other authors of undoubted credit, besides Hildanus, but with regard to the facts themselves I must confess my infidelity: because as I have before observed the gout is a hereditary disease, so intimately blended with the very es-

essential materials of our existence, from the first organization of the foetus, even in the formation of our most solid parts, that I cannot think it possible to remove it without the constituent parts of our bodies were disunited and resolved into their first principles, a process incompatible with our existence: therefore it cannot in the nature of things be a curable disease. Vanswieten gives some instances, I have heard of some myself of cures by a milk diet of a very long continuance: but I believe on a strict investigation that all those pretended cures, which have been adduced in proof, of the efficacy of certain nostrums, and certain regimens, are no other than an apparent mitigation of symptoms arising from a debility superinduced in the system, which prevents an acute paroxysm from taking place, at the usual periods, but they carry indubitable marks of inactive gout remaining in the system under a chronic form.

From this exordium, you may suppose that I have no nostrum, and no method of cure to offer in this distemper. You may be right in your supposition, and may ask, what have I to offer that can be worthy of attention in the treatment of a distemper I have declared to be incurable? I flatter myself however that I have some observations and some facts to relate, which will point out the means of miti-

gating the distressing inflammatory pain, lessening the periods of the paroxysms, and preventing the rigidity and distressing lameness which remain in many arthritics in the intervals of those paroxysms. Desiderata, I conceive, of no small importance to gouty people.

On being attacked by the gout myself I was naturally led to examine what authors had said of that distemper, especially in relation to the treatment of it: but finding so much contradiction and so much whim, and nothing absolutely founded upon practical facts, I was dissatisfied, and the disappointment I repeatedly met with in following the advice of the best, in the first five years I was afflicted with this distemper, disgusted me so much that I laid them entirely aside, and began to study the course of the distemper as it appeared in myself, and from my own feelings and the evidence of my senses to regulate my conduct in the treatment of it accordingly.

From the most accurate investigation of it in my own person, it appeared evidently to me that every attack was accompanied with symptoms of a highly inflammatory distemper, and during the commencement of the paroxysm was as much so as pleurisy, peripneumony, acute rheumatism, or any other phlogistic disease: indeed it resembled the inflammatory

rheumatism more than any of the other. Here was intense pain, great heat, violent inflammation, so great as even to render the vasa minima almost impervious to the blood, fever and strong, full, pulse: such a pulse as, Huxham says, in treating of another disease, he would bleed for, ay even if it was in the plague. Under such symptoms why not bleed here? does not common sense with a very slender degree of medical knowledge, point out the necessity of it? will it not help to lessen the impetus of the blood, and prevent the violence nature often suffers in overcoming the resistance, the obstruction of the capillaries, as much as in pleurisy, &c. and by assisting to abate the general inflammation in the part, contribute the sooner to render the vessels pervious and restore the freedom of the circulation? But authors say it is wrong, it is dangerous, it may cause a retrocession of the disease! a disease which must be left entirely to nature, and she must not be disturbed in her business! so it has been said of exanthematous diseases, as small pox and measles; bleeding and evacuations, and cold air were destructive, they would occasion a retrocession of the eruption, and endanger the life of the patient. But the boldness of the Suttons pointed out a happy improvement in the treatment of the small pox by inoculation, which entirely overturned

the old practice and showed it was founded in error and continued from prejudice: however humiliating it might appear to the pride of regular professors. This happy discovery forms a remarkable era in the practice of physic; as it laid the foundation for a more rational and successful treatment of fevers of every denomination, as well as the small pox: which every honest and humane physician not only acknowledges but practises. If prejudice in favour of old customs, had so fatally misled practitioners in the treatment of the small pox, why may we not conclude that the same attachment to what had been recommended by ancient authors, and early writers on this disease amongst the moderns, might mislead practitioners, in such an extraordinary, versatile, distemper as the gout. We find them talking of the danger of a retrocession of gout, from bleeding and other evacuations, but there does not appear, that I know of, a single proof of it upon record. The gout is so variable in its appearance, and so extraordinary in its shifting from place to place, that I do not hesitate in saying that the natural progression of it in subjects loaded with an uncommon quantity of disease, might easily be mistaken for the effect of the treatment: and indeed there is so much contradiction in opinions respecting the treatment, that a man that would wish to regulate his practice by res-

pectable authorities, is so much bewildered that he does not know which to choose.

Those very authors who condemn bleeding and other evacuations in the gout in the extremities, gravely tell you if it attacks the head, lungs, &c. that blood must be immediately taken away: as this is confessedly to alleviate the inflammation, why may it not be done with equal advantage when it is violent in the extremities? From this view of the matter I was strongly prepossessed with an opinion that this practice must be attended with the best effects, I therefore lost blood in a quantity proportioned to the degree of inflammation, and state of the pulse, and always with great relief, and I declare most sincerely that I never felt any thing like a retrocession of gout after it, although I have used this practice eighteen years; and can safely affirm the same with regard to some of my friends: one gentleman in particular who loses generally twice, sometimes thrice the quantity that I do, by repeating the operation, indeed I have sometimes thought imprudently: he is of a plethoric habit, and can bear it better on that account, and suffered no debility from it; he however never had any retrocession of gout, but always reaped great benefit from this practice and that which is the subject of the next paragraph. Some medical authors tell you that a single

cathartic or breathing a vein will often bring on a fit of the gout immediately ; but further, (mark, my friend, the dreadful sentence!) if either is attempted in the fit itself, it will throw the gout all over the constitution, and the greater the evacuation the more dangerous the event !—I can only answer, that if I may speak from my own feelings, I do not believe a single word of the assertion : it is from mere conjectural theory and not from facts ! I have taken mercury, &c. and have lost blood repeatedly during the paroxysm, perhaps I have done this more than any man living, notwithstanding this dreadful anathema, not only without feeling a single inconvenience, but on the contrary the greatest benefit, and, my friend, you as well as others know that my fits are no trifling ones : therefore I must infer that this opinion is founded on false theory, and consequently erroneous.

Upon the same principle that I used bleeding (the lessening the inflammatory diathesis) I was induced to try the effects of calomel* and opium. You, my

* The reader is referred to a paper by Dr. Hamilton, upon the Effects of Mercury in inflammatory diseases, published in the 9th Volume of Dr. Duncan's Medical Commentaries, for an account of his reasons for the application of it in those cases, from an opinion of its antiphlogistic properties ; and his success in the trials he made of it, in contradistinction to the general opinion entertained of its stimulant powers. The author left a manuscript Second Part to the above paper, which has not yet been published.

friend, and many of our medical acquaintance, have long seen the great benefit derived from the use of calomel and opium in every kind of inflammatory disease, with the occasional addition of tartar emetic and camphire, as circumstances pointed out : and you know that it has been marked with such a series of success, that it has become a general practice within our circle of acquaintance.

From a series therefore of successful experience, I was determined to try it in another inflammatory distemper, which I have already said a paroxysm of the gout appeared to be. I have taken them myself in every fit, and always obtained great relief from their exhibition, as have many of my friends, in particular the gentleman before mentioned. Notwithstanding the prohibition of purgatives by authors of great respectability, as detrimental in the gout, I could not help thinking, that as it was founded upon the same principle, the danger of a retrocession of the disease, there must be a mistake in the rationale of it: and indeed the very directions of the same authors to administer carthartics, when the gout attacks the head contents, of the thorax and abdomen, most undoubtedly with a view to abate inflammation, forms such a contradiction to the general principle they would inculcate, that I cannot help thinking it must be founded in error. I do not

know a single instance that is adduced in proof of this retrocession, and from the same reasoning that inflammation is lessened in the head, lungs, and contents of the abdomen, by the exhibition of cathartics, it must hold good in violent inflammation on the joints. The following consideration will however point out the necessity of administering them, if the inflammation did not exist. Most gouty people are of a costive habit, at least if they were not so before they were attacked by the first fit, they become so afterwards: certainly this disposition is augmented by degrees; and the want of exercise, when tolerably free from the disease, and the almost total rest during the paroxym, with the increased secretions of sweat and urine, greatly contribute to it. Must not the retention of putrid fœces be injurious in any disease with febrile symptoms? Will not an absorption of putrid sordes, from the cavity of the intestinal tube, increase the distemper? These are questions common sense must resolve! Clysters are recommended, but they reach but a small way into the intestinal tube, and in general only empty the rectum. Something more then is necessary, the whole canal wants to be cleansed, and an eccoprotic is plainly indicated for this purpose, as before observed: and we know not but medicines of this class are pointed out by nature. The diges-

tion, before the fit, is generally very indifferent, the appetite lessened; there is sometimes great sickness and a loathing of food: when this is the case, the alimentary process cannot be carried on in a regular and salutary manner; crudities will arise in the primæ viæ, vitiated chyle must be taken into the blood, the habit will not be nourished, and a morbid affection in the system will be induced. From these circumstances does it not appear probable that the cause of the gouty paroxysm, about to make its appearance, is accumulating at this period in the first passages, and, from thence is diffused through the habit, and excites the latent gout into action by its stimulus? This is rendered more probable from a spontaneous vomiting sometimes relieving the patient, and a spontaneous diarrhœa coming on sometimes at the going off of the most violent symptoms of the paroxysm, from which I have known very great relief received. This evacuation I observed did not diminish the natural discharge by sweat from the parts affected, which continued notwithstanding: and the great benefit received from it convinced me that a great deal of gouty matter was evacuated by this spontaneous diarrhœa. This circumstance may certainly be adduced in favour of occasional cathartics, during the paroxysm of the gout, and will go some way to overturn the opinion of its being a

dangerous practice: since experience is the basis on which I may found it, and facts cannot be controverted. An inference of some consequence naturally arises from considering the foregoing circumstance; would it not be of use to attempt to prevent an indigestion, and the abovementioned supposed accumulation, which I am strongly induced from my own feelings to believe takes place, by administering an emetic and cathartic as soon as the appetite begins to fail, and strengthening the tone of the viscera by chalybeate waters, bitters, and the bark? I never have tried the experiment here suggested, but as I believe it may be attended with advantage, and not with prejudice, I certainly shall: although emetics have a very disagreeable, indeed painful effect upon me, by inducing a spasm on the upper orifice of my stomach, which entirely prevents their operation. The painful sensation occasioned by them has made me decline taking any medicine of that kind, upwards of twenty years.

The cathartics which I have generally employed are the cooling eccoprotics, in the inflammatory stage, or warmer aloetics, as Tinct. Sacr. on the decline of the paroxysm; and I can safely aver with considerable advantage. I therefore without hesitation declare, that I think cathartics are not only attended with safety in their exhibition, but with very beneficial effects in the gout.

Medical writers recommend the application of blisters and sinapisms to the extremities, when the gout seizes the head, chest, stomach, &c. with a view to make a revulsion from the parts affected. Having repeatedly seen the application of blisters attended in those distressing cases with the most happy consequences, I paid particular attention to their effects, and observed that in proportion as an inflammation was excited on the skin by the blister, the pain and other symptoms abated, and as the blisters rose and the discharge increased, they went gradually off.

From these observations, I imagined that as blisters certainly allay inflammation, for that reason are used with success in pleurisies, peripneumonies, &c. and proved of such benefit in removing the gout from the parts abovementioned, they must be of use to abate the violence of the inflammation in the articulations, of the feet and knees for instance, and contribute to discharge the gouty matter. Impressed with this idea I applied them, to my feet on the instep near the ankle, on and near the knees whenever those parts were attacked. The benefit I received from them greatly overbalanced the temporary pain they occasioned. If I applied them over night the intenseness of the pain and inflammation was gone by the morning, and as the blisters discharged,

entirely went off: but as many small fits that daily return in different parts compose what is called by Sydenham, the grand or cardinal fit, I have been obliged to repeat the application to different parts, as the former blisters dried up, so that during the whole paroxysm or cardinal fit, several are repeatedly applied, and indeed so great is the relief I receive from them, that as soon as the pain begins to be intense, with the concomitant inflammation, I directly have recourse to my certain friends, the blisters: I have used them in my own case upwards of eighteen years. I had long put this method of practice into execution on myself before Dr. Stephenson's pamphlet fell into my hands, which contains much good matter on the subject of blisters in the gout, mixed with much eccentricity. Their effect upon me is very extraordinary: about the second day after their application, when the discharge is very great, the inflammation is also intense where the vesications were, and when I put my legs out of a horizontal position, as for instance in sitting on the bedside, the throbbing pain is prodigious in the site of the blister, and is exactly similar to the same sensation I used to have in the diseased joints of my feet, whilst the gouty inflammation remained in them, when I put them out of bed; and it continues for a minute or two and then gradually declines exact-

ly in the same manner, whilst the diseased joints themselves remain perfectly free from pain, and this happens when the blisters are applied at a distance from the joints either of the feet or knees; from which circumstance I generally now place them at a distance. If the foot and knee are affected at the same time, I place the blister above the ankle on the inside of the leg, on the part where they are generally put in fevers: and this place I find more eligible than any other, being fully efficacious in relieving both the foot and knee. On this spot the throbbing pain abovementioned takes place with the gouty inflammation: but it is not felt unless I hang my legs in a sitting posture, or when I get up to walk, when I must pause a little till it abates and in a short time it leaves me. This pain is not alike in all blistered parts, but chiefly confined to those to which the greatest quantity of gouty matter is determined, and blisters there are generally the best applied. I have had two on each leg open at once, but in succession: three gave no pain, and the last seemed to have absorbed all gouty pain. The sensation on getting out of bed continues several days. After the blisters have discharged two days there is something like pus appears upon their site; then it is that the peculiar smell takes place in the discharge from them, which the gouty effluvia from the spon-

aneous discharge of sweat from the feet, so strongly exhibits on the decline of a paroxysm: a smell which there seems nothing like on the face of the earth: though I have lately thought that it bears a faint resemblance to that of dry human bones, as a skull for instance, which is emitted after rubbing it with a dry hand. The inflammation and pain on the blisters, abovementioned, and the peculiar smell of their discharge, are sufficient demonstrations that a great part of the gout is translated from the joints to the blisters, and is there discharged, and are sufficient evidences that the disease depends upon fluid matter, *sui generis*, which here finds an artificial outlet.

Besides the relief from pain, and abatement of inflammation afforded by the discharge of the blisters, this discharge is attended with another great advantage the abatement of tumour occasioned by the infiltration of a serum or other watery part of the blood into the cellular membrane of the diseased part: the absorption of this fluid is certainly promoted by their effects, and great pain is discharged at the vesicated surface. This is rendered pretty clear not only from the lessening of the swelling whilst the blisters run, but from this diminution stopping, when the discharge from them stops. Another advantage is obvious; the great accumulation from this extravasation about the joints

is prevented, and that stiffness, from the inspissated stagnant fluid, about the ligaments, &c. in a great measure obviated, at least I find it so in myself, my joints being perfectly free in their motions when I am clear of the paroxysm. May we not infer from this that a discharge thus procured of the stagnant fluid in the cellular membrane, may be in some degree the means of preventing chalky concretions? Dr. Stephenson seems to have entertained this idea, and I believe he is right.

It has been alleged that blisters are liable to occasion a retrocession of gout :—this I believe to be ill founded, from the very nature of the effects of these applications ; however the facts above related are presumptive evidences to the contrary : besides I never felt the least symptom of a retrocession, and I really believe that some of those instances of a supposed retrocession which so we often hear of, are no other than varieties of it, different parts being affected in the progression of the disease in subjects loaded with a superabundant quantity of it (as before observed) of which there are many instances in the world.

LETTER VIII.

Dear Sir,

The spontaneous sweating from the feet and other parts affected by gout, which takes place on the decline of a paroxysm has been considered as the only outlet by which nature carries off the morbid cause of the disease: and the peculiar smell which attends it seems to confirm the conjecture.—I am convinced from experience that although it is the principal, yet, it is not the ONLY discharge by which the crisis of the paroxysm is completed. First, because a spontaneous diarrhoea frequently takes place at that period (as already noticed) and also an increased secretion of urine, which is the more remarkable, as it is very large on the decline, and very sparing during the paroxysm; and these increased discharges are attended with manifest relief: and secondly because I have known also a large discharge from the salivary glands continue for some days, and not unfrequently a large expectoration, both with and without a

cough, of a mucus of a very peculiar and disagreeable flavour, and this also continued through the whole of the decline of the paroxysm, without any apparent diminution of the sweating from the feet; which leads me, as I have attended particularly to these circumstances in repeated instances, to believe that all the emunctories are employed by nature, in discharging the morbid matter, the accumulation of which was the cause of the paroxysm.

But the sweating from the parts affected is attended with so peculiar a smell, and continues such a length of time, that this discharge has been regarded as the only critical evacuation, both by medical people and arthritics. For this reason, the gouty man, the moment he is attacked, wraps himself in flannel, confines himself in bed covered with a load of blankets, whose weight he contrives to keep from the parts affected, weltering in heat and sweat for many successive days and even weeks; breathing the filthy atmosphere of his own steams, in a close chamber, with his bed curtains drawn close round him, and a free circulation of that salutary principle, fresh air, denied admission, lest by the influence of cold a retrocession of gout on some of the noble parts should take place. This I am sorry to say has often been the language of doctor and patient: but a seasoned arthritic thinks himself com-

potent to the business without the assistance of the doctor, and we see him condemn himself by this preposterous treatment to suffer real evils, to shun imaginary ones; till when the pain is gone, at the end of eight or ten weeks' confinement, he is dragged out of bed an exhausted, miserable cripple, unable either to stand or go. This is by no means an exaggerated picture, but drawn from life: several of my acquaintances have obstinately persevered in this plan till they have destroyed good constitutions, and rendered themselves ten times lamer than they would otherwise have been; and it cannot but be so.—Every surgeon knows, in the cure of fractures of the leg, especially compound ones which require long confinement, in persons otherwise of good constitutions, that by the mere want of motion, the knee and ankle joints as well as the toes become so rigid that many months, sometimes years, elapse before they recover their motion, and sometimes indeed they never recover their usual freedom at all: this is supposed to be caused by the inspissation of the synovia; but whatever the cause may be, the fact is so. If therefore, this is the case, where the joints labour under no disease, and that mere want of motion will produce this effect, how much more may we expect it to be so if we add to the want of motion the most violent gouty inflammation round the joints, with intense heat, a heat artificially kept

up by double yea quadruple wrappers of thick flannel, under the false notion of bringing on a sweat, and preventing a retrocession of the disease? I say a false notion, because it is impossible a sweat can take place until the inflammation abates, the very effect of which inflammation is a stoppage of the pores from the compression of the distended vessels on the excretory ducts, and the crisping up and parching of the cuticle by the intense heat, which renders it impervious to the perspirable fluid: and when such pains are taken to keep up this heat by the surrounding flannel, the inflammation cannot speedily abate: I have on the contrary felt the inflammatory heat and pain augmented by this mismanagement. When I first had the gout I did like my neighbours, wrapped the diseased feet in flannel, and adopted the fashion soon after invented of covering them over the flannel with the oiled silk bootikins, with a view to confine the heat and sweating, and form, as it was called, a kind of warm vapour bath: this was said to be attended with the best consequences; but the distressing torment I felt in the height of the inflammation, which was highly aggravated by the confinement of intense heat, soon forced me to lay flannels and bootikins aside and to adopt another and more cooling plan, with great advantage.

The sweating process has however been univer-

sally adopted, (notwithstanding the mischief it has done by being carried to the extreme) upon the hypothesis of sweating being the only evacuation which effectuates the crisis of the paroxysm. This has given rise to many inventions to bring on this evacuation prematurely, and push it to the utmost, under the delusive but flattering hope of obtaining a perfect cure of the gout, and we may readily believe these were grasped at with avidity by the suffering arthritic. Some modern medicines of this kind I believe have not escaped your memory. I will however recal some of them to it, and first the celebrated quack Dr. Ward's sweating powders: the first of which as the process of its preparation stands in Mr. Page's pamphlet, consists of ipecacuanha and opium, &c. and is nothing more than Dover's powder, only with a parade of deflagrating the nitre after the ingredients are mixed, which certainly must rather injure the ipecacuanha by burning, on which and the opium the virtues of the compound unquestionably depend, and therefore the medicine is the worse for it. The second has white hellebore instead of ipecacuanha, and a fifth less of opium, the other ingredients are in fact the same, although a parade of a different process is made. Another I shall name, which made some noise in the fashionable arthritic world, was a medicine in-

vented by a Mrs. Dutton (I think her name was) at Henley upon Thames, who pretended to perform cures by a particular sweating process: the composition of her medicine was kept a secret, but it appeared to be no other than a strong balsam, guajac. The patient took this in certain doses, and was sweated naked between blankets, with a load of covering, in a bed closely surrounded by the curtains to keep in the steam, and thus lay weltering in a mass of corrupted, perspirable matter, and foul air, for the space (I am told by one of the sufferers) of a week: at the expiration of which he came out exhausted, free from pain, but not from decrepitude; and most certainly not from the distemper, which notwithstanding all this severity, returned again at the usual periods.

The famous Buzzaglio's method is upon the same sweating principle, I am told, as far as the imposed secrecy on the patient has allowed it to transpire, but conducted in a different, and so far more sensible, manner, because exercise constitutes part of the plan; this however is said to be carried to the extreme, and therefore must be hurtful.

The mischief which ensues when the sweating, whether spontaneous or artificial, is carried to excess, seems to be this: the intense inflammation leaves the parts, when the sweating is established, in a state of

great debility, much swelled by the infarction of the cellular membrane, and the joints incapable of motion at this period, without great exertion by the patient. But no exertion is made, and he acquiesces in their torpor and lies motionless in bed, sweating most profusely, with the parts surrounded by flannels. The synovia for want of motion will thicken, and the intense heat will increase the spissitude. The extravasated, lymphatic fluid in the tela cellulosa will also thicken, and the finer parts being evaporated, the heat will increase the spissitude of this also; and as the tela is not only interwoven in the texture of the ligaments and tendinous aponeurotic expansions about the joints, but surrounds them as the universal, connecting medium, the cretaceous matter, in this state of rest, will be deposited and add to the calamity; these parts therefore must particularly suffer, and become of course rigid and lose their action; and, in short, whilst the heat is thus artificially kept up, the evaporation of the finer parts will go on through the pores, and the whole mass of inspissated fluid, become as it were baked by the intenseness of it; and every successive fit, by the same maletreatment will increase the rigidity, until the joints lose their motion entirely, and become as it were ankylosed, and the cretaceous matter in them will be hardened.

This, you will say, my friend, is a terrible picture! I am afraid however it will be found to be a true one, and I could point out some cases now existing, which on examination will confirm it. I am persuaded myself from experience that this mischief would be wholly prevented by a different treatment; and in all things I here assert experience is the criterion by which my practice is directed; for you may be assured that all the appearances and effects of this distressing disease mentioned in these letters, except where the worst of the latter have been prevented by my mode of treating it, and the course of treatment recommended from an attentive observation of them, have been experienced in my own person as well as in those I have attended. When thus profusely sweating, were the coverings of the bed made as light as the patient could bear them without feeling any pain from cold, no flannels wrapped round the joints, but only a thin, cotton or worsted, gauze stocking, such as is worn under silk, drawn on to lie in, to prevent friction from the sheets, when the limb is moved; the inflammation would be less, would sooner abate, and the sweating would sooner appear:—for, there is a certain period or acme to the inflammatory stage, generally from the fifth to the seventh day, before which, it is not found by experience that the sweating can take

place. That this period is protracted by the preposterous increase of heat, from that heat's being confined by the thick flannels, and the load of blankets in the bed, is beyond a doubt, I have known by experience. By this increase of heat, the cuticle becomes parched and dried, and denies the transudation of perspirable matter through the contracted rigid pores : and when this is the case, the sweating is not fully established until the parched cuticle cracks in many places, relaxes, and is actually pushed off and separated, by the moisture underneath, from the true skin : and much time is lost, and much does the patient suffer ere this happens. But— a proper degree of exposure, with a light covering, to cool air, instead of preventing the sweating—a circumstance so much dreaded by arthritics invalids, on the contrary, by allaying heat and inflammation, actually promotes it. This I have repeatedly experienced in myself: it is my constant practice to leave my bed as soon as I can put my feet to the ground, and to keep up as long as I can bear it, without fatigue, or increase of pain. This practice instead of checking the perspiration, appears to promote it, and it continues under the vicissitudes of exposure to cool air, until the symptoms of gout cease; which does not take place till many weeks after my walking abroad, on my professional avocations; and I

always find that too warm covering on the bed brings on heat and pain in the night, which leave me when it is removed. Here I cannot help mentioning a circumstance which happens to me and I apprehend to every arthritic: when I am in a convalescent state, I observe when I get up in a morning, that my joints are feeble, stiff, lame, and not without pain, and I make a very bad progress in walking; but, after I have used a little exercise, those symptoms gradually disappear, and in the evenings I can walk extremely well, and nearly without lameness. I also find that by sitting long, even in a chaise, although there is motion, but more especially by sitting at a table to read or write, for any length of time, my joints become stiff and lame, which sensation soon goes off by walking: and I find likewise during this convalescent period, my stockings wet in the feet, and my feet in a full perspiration at night when I go to bed; which are not so when I am well, as I have in health dry feet. All this may, I apprehend, be adduced as no small proof of what I have been endeavouring to show, that a confinement in bed, and heat, most undoubtedly render the disease worse, and that a propensity to indulgence with a view to relieve pain, by sweating to excess, lays the foundation for an incurable lameness, as must appear from the facts related.

I find from experience that extremes of every kind are prejudicial; that extreme heat or extreme cold never fail to excite spasms and often a fit; that too much exercise, so as to fatigue, or extreme indolence are equally hurtful. I am confident that extreme intemperance will produce, and extreme debility will protract a paroxysm: and am convinced that a happy mediocrity of conduct and diet which avoids extremes of every kind, is one of the best preservatives from, and affords the readiest means of eluding, the most distressing consequences of the disease.

The popular method of treating the gout ^{in the stomach} was to attack the enemy with fire and faggot, and force him vi et armis from his strong hold in that viscus to the extremities, this was thought to be best done by strong drink of every kind, from the strongest wines to spirits simple and compound of every denomination, and the stronger and more above proof they were it was thought they were the better for this purpose: that this was inconsistent must appear from considering the nature of the attack; and the consequences proved it to be so and in the end fatal; since it superinduced a complication of maladies which involved the arthritic in destruction. The effect of ardent spirits used in the gout in the stomach is, that taken in a moderate quantity the dis-

ease is increased—in a large quantity by means of their sedative power, the nerves are rendered torpid ; and their use too often occasions the bad habit of dram drinking, which terminates the victim's life by jaundice and dropsy. All this might be prevented by opiates, stimulating the extremities, emollients and eccoprotics, and calomel with alkaline salts ; the contrary is not only an erroneous practice, but is deduced from mere traditionary example, not from common medical knowledge : I am therefore surprised at Professor Cullen's inculcating this practice.

The celebrated Dr. J. Brown pretends to remove a paroxysm of gout by what he calls *stimulus direct* : he showed his pupils this in himself by drinking a bottle of wine before them. This artificial energy may be sometimes right, but, I cannot think it right for a man to get drunk when he feels a fit approaching, with a view to remove it : he may be deceived and bring on a worse disease, apoplexy. This was probably done from the supposition that gout is caused by debility, but as it certainly is phlogistic and its consequence debility, first let the phlogistic diathesis be removed by mercury, opiates, and cathartics, and then the *stimulus* may come in for its share in restoring energy and health !

LETTER IX.

Dear Sir,

I shall in this letter give you an abstractive concentration of my opinions and conclusions on the original cause and nature of gout, deduced from facts, and reasonings from those facts, recorded in the foregoing letters and which are there given in detail. Should I appear to be guilty of too much repetition, you may believe it is from a conviction of the importance of the subject, the relief of a distressing distemper: to attain which I think that a just idea of it cannot be too deeply impressed upon the mind.

From the following abstractive arrangement of my opinions and conclusions, the processus integræ podagræ may be easily understood: I shall conclude my letter with concentrated directions for the treatment of this disease, according to the principles I have laid down; and with that shall close a correspondence which was pleasing at its commencement from the hope of its affording some hints to

relieve your pain, and as in its progress it has grown to a volume, from the various digressive remarks it has occasioned, I shall conclude it with additional pleasure, in the hope of its becoming of general utility: since I intend now to offer it to the world; though with some diffidence of its reception from its militating against received opinions.

The opinions and conclusions I have formed, from the facts and reasonings recorded in this series of letters, are the following.

1. That the gout is hereditary, and that descent from parents is the only cause of its origination and continuance in the human species: but we are ignorant how it entered the human system, unless we allow of its existence in the species from the creation.

2. That the materia morbifica of the gout appears to be an extremely subtile fluid, sui generis, and that it is coeval with our existence, or rather existed before it, blended in the materials of it in a fluid state, and therefore is the first and only cause of the disease. But as it existed thus in the origin of the first fluids, and as the whole of the animal was originally in a fluid state, it must in a manner enter into the component parts of the texture of the solids, with the materials of their formation: and hence the gout becomes a disease of the fluids and solids together,

and cannot be separated from the latter but by returning again to a fluid state, and in this form being evacuated from the system, during the resolution of the paroxysm; and this becomes obvious to the senses by the smell of the discharge during the partial dissolution of the solids, in the general waste sustained during the decline of a paroxysm. Yet from the very nature of its intimate mixture with the whole of the component parts of the fabric, it is impossible it can be wholly discharged, unless a total dissolution of the body were to take place, which is incompatible with life, and therefore the gout can never be exterminated from the habit, and of course is an incurable disease. But how this subtile matter first originated, thus to be entailed on posterity, is a problem never to be solved.

3. The solids therefore and particularly the nerves are secondary causes, that is the instruments which receiving the stimuli, excite the morbid fluid into action and produce a fit: for if it was not present in the constitution no such consequence would happen, as appears evident in those who have no gouty stamina from descent: as excessive exercise, extreme cold, blows, strains, hard drinking, crapula, &c. are known to excite no such consequences in people of this description; but complaints of a very different nature, and merely dependent on the nature of accidental stimulus.

4. Therefore all stimuli ab infra et ab extra, are not original causes predisposing the habit to receive the gout; but only exciting causes of rousing into action the gouty virus latent ab origine in the constitution: for if it were not there, a man might drink hard, catch cold, &c. with impunity as to the gout, as is obvious to common observation every day.

5. That it is an extremely acrid, subtile principle, to act with such extraordinary rapidity as to excite the pain in such succession from joint to joint: but its *modus operandi* is a mystery never to be solved.

There seems to be a singular, peculiar, sympathetic regularity in this progression of its activity during the paroxysm. One part for instance of the foot is attacked, it removes successively to others, gradually leaving the first parts affected; the other foot is seized exactly in the same parts and in the same succession; presently one knee, generally on the same side with the foot which was first affected; it goes round that in a progressive way, and then ceases, upon the other knee's being seized exactly in the same manner. This is called by some *metastasis*; they may call it what they will, but I think it is the regular progression of the distemper.

The acme of every single paroxysm of gout is from the fifth to the seventh day: after that it declines. What I mean by a single paroxysm is that

in the simple part attacked: for instance the ball of the great toe. This goes the period stated, but, when the gout is at its acme there, the symptoms decrease in that part, and as the gouty commotion is excited, but does not expend itself there, it appears in the neighbourhood: perhaps in the heel, sole of the foot or outside of it, the ankle or the knee. Thus it goes on, till its course is finished, first in one extremity then in the other, and sometimes in the loins, hips, shoulders, elbows and wrists: and this complication of individual fits forms a compound aggregate of one; although the attack and progress of the disease in each part may be considered as one in that part.

6. That gout is an inflammatory disease in the early periods of its attacks; it may remain latent in some constitutions of not sufficient powers to develop it, and which therefore cannot produce a regular fit: yet wandering pains will declare the presence of the enemy, and persons of such constitutions, though it remains inert in them, may convey it to their posterity. The various distinctions of authors with regard to the appearances of gout may therefore be reduced to two, the acute and the chronic: and though it is a disease of a highly inflammatory nature in its acute form, not caused by debility, but producing it on the decline of a pa-

roxysm, its repeated attacks and the gradual advance of life occasion it at length to appear principally in a chronic form, sometimes earlier, but, mostly in old age.

7. That tophaceous concretions are probably caused by the earthy matter of the bones, being whilst in a state of rest, deserted by the aerial acid which held it in solution in the fluids: that calculi in the kidneys and bladder are owing to the same cause, and as a course of Bewley's* julep is found to dissolve calculi; the same may in the intervals of paroxysm, prevent the accumulation of, if not dissolve, the chalk stones.

* Made by completely saturating a solution of Salt of Tartar, in water, with fixed air, in Nooth's glass machine, improved by Parker; in the common way from chalk and vitriol. The quantity of one ounce of Salt of Tartar should be put to a quart of boiling water in a stone vessel, and when the liquor is cold, and the calcarious earth of the water precipitated to the bottom of the vessel, it should be carefully poured from the sediment into the middle vessel of Nooth's glass machine. It generally takes up the space of three days to saturate it completely with the aerial acid, when twice the quantity of Sal. Tartar. is used (which is sometimes done, but the above quantity is best) and four, sometimes five measures of the vitriolic acid and as many measures of chalk to effect it. When arrived at the point of complete saturation, absorbing no more fixed air, which is known by the water in the upper vessel remaining stationary ten or twelve hours, while no more air is extricated from the chalk in the lower vessel, it is time to draw it off; which it is best to do into pint bottles, which should be corked well and placed with the necks downwards. It is better not to swallow acids immediately after the julep, as the effervescence of

8. That as the gout is incurable, the stories recounted of its being cured by terror, &c., though told by authors of credit, cannot be believed, and it may be inferred from all that has been there advanced that those authors† could have no positive

the acid and alkali will occasion great part of the fixed air to escape by eructation, which otherwise would enter the habit, the effect intended by taking the julep. This is a very wholesome antiseptic beverage, and may help the constitution by sweetening the juices, independent of its use in dissolving calculi.

My friend Bewley says the alkali is so tenacious of the superadded quantity of aerial acid, that he could not expel it by a boiling heat. I doubt he was deceived in this matter. I am afraid the alkali retained but a very little (if any) more than its natural quantity, which the fixed alkali, as it is in a manner the child of fire, will retain even in a strong red heat. And I find that every time I take the cork out of the bottle I have in use, there is always a fresh quantity of air let loose in the intervals between my doses, which has force enough even to explode the cork, if the bottle stood upright, and, as it is, with its neck downwards, and resting on the cork, the spontaneous extraction of air from the mixture frequently forces the liquor out by the sides or pores of the cork. Therefore the aerial acid must be separated from the saline liquor, by the heat of the atmosphere only.

† Even the respectful authority of Vanswieten is doubtful; as he does not say that those people, in the instances he mentions, were never afterwards afflicted with bad digestion, or wandering chronic pains: besides Vanswieten follows the ancients and some moderns, in distinguishing the Podagra, the gout affecting the feet only, from the arthritis, affecting all the joints: and from his account of arthritis being always attended by an acute inflammatory fever, it would appear on comparison to be little different from the acute rheumatism, in short they seem, though treated under distinct heads, to be confounded together. He says the arthritis is cured sometimes after one fit and never returns—*Plures enim vidi, qui hoc morbo graviter decubuerant, et postea penitus immunes vixerunt.* Vanswieten. Com. de Podagra, page 189. Tom. iv.

proofs of its being so. In my own case I know that an energy of mind exerted upon extraordinary occasions, will cure a fit of it; but I also know by experience that it cannot effect a radical cure of the disease. Yet although the gout is incurable, it is in the power of medicine to relieve and abbreviate the distresses of the patient; and by avoiding adventitious stimuli from hard drinking, or other irregularities of conduct, exposure to extremes of cold or heat, and external injury, as far possible, &c., a fit out of the regular course may be prevented: though some of these exciting causes of gout it is impossible to avoid, from the circumstances of human life itself; mental distress must be experienced by all; external injury cannot always be guarded against; and the avocations of active life must necessarily expose men to vicissitudes of weather. Of these vicissitudes every member of the medical profession must come in for his share; which was one reason of the remark in the first letter that no greater misfortune could befall a medical man than such a disease. He may be exposed in the pursuits of his business to journey under a meridian sun in the hottest period of summer, and to travel in the middle of a snowy night in the severest part of winter. His mental feelings are likewise often hurt by the scenes of distress he is obliged to witness, sometimes with-

out the power of relieving, when the patient labours under a malady which must quickly terminate in death. Having often experienced these situations, superadded to the disease which is the subject of my remarks, I know what effect such exciting causes may have. To vicissitudes of weather the soldier, sailor, mechanic and husbandman must also be unavoidably exposed: as far however as these and every other exciting cause may be avoided, they ought to be guarded against by the arthritic sufferer.

The following is a concentrated view of the mode of treating the gout, which from facts, reasonings from those facts, and experience I would recommend.

When the gout attacks a person of a full habit, with symptoms of great inflammation, strong full pulse, and intense pain, blood† should be taken away without hesitation, in a quantity proportioned to the violence of the symptoms, and strength of the constitution; and a dose of calomel, opium, and tartar emetic, given in certain portions, according to the state of the patient, and repeated according to circumstances; and if this medicine does not

† The ancients used venesection in the part itself. Vanderheyden and some moderns advised the same, and even by way of prevention, to open a vein in the great toe, the seat of the gout, twice or thrice a year.

open the bowels, which it generally does, at the same time that it promotes perspiration and urine, a suitable purgative should be given to answer the purpose. But if the disease goes on, extending to different parts in succession, for instance the feet and knees, blisters should be applied, but not immediately on the diseased part, but on the inside or outside of the limb, between the aggrieved joints, as much as possible upon the course of the large lymphatic vessels: these are constantly attended with the most beneficial effects, discharge prodigiously, and the discharge has strongly that smell so conspicuously peculiar to the perspiration of gouty people, and evidently shows that a great deal of gouty matter is discharged this way. Whilst this is going on the opiate with calomel and tartar emetic should still be taken, and a plentiful dilution with weak wine whey, barley water with a little wine, or any tepid liquor the patient may have a fancy for. When the inflammatory symptoms and pain abate, and debility in the diseased articulations becomes now distressing, wine should be used with greater freedom and the diet should be more generous according to the state of the stomach, and the peruvian bark given in full doses.

As the acute gout is certainly an inflammatory disease, and should be so treated, though practi-

tioners have been afraid of treating it in this way under the notion of the danger of its retrocession, those practices are erroneous which have been instituted to prevent this, for instance wrapping the diseased limb round with a load of double flannel, which from undoubted facts arising from personal experience of many years, is found by accumulating heat in an extreme degree to aggravate every inflammatory symptom, and by inspissating the coagulable lymph and synovia or jelly of the joints, and thus as it were baking the limb, by the intense increased heat, leaves the joints rigid and contracted, and increases that afflicting debility, consequent to repeated attacks of this distressing disease. If the joint thus wrapped up sweats, the patient hopes it is for his advantage, but the misfortune is that it is only the finer fluid which evaporates, while the coagulable matter is rendered by these means thicker, and aggravates the distressing lameness and rigidity of the part. A thinner covering of bedcloths should be used when the patient has the gout than at any other time, he should leave his bed as much as possible, and there should be a free circulation of air through the room, no flannels should be worn on the diseased part, and only a pair of thin gauze stockings drawn on when the legs are blistered, to prevent friction from the bedcloths ; though even these

I have found from experience occasion so great an accumulation of heat and pain, that I am glad to get rid of them. What then are we to think of the late contrivance of fleecy hosiery? I am convinced from my own feelings that although it is necessary to protect the limb from the influence of too much cold, yet the accumulation of heat which these stockings must produce, especially during the fit, must do all the mischief I have pointed out.

The doctrine of what is called retrocession in gout is not founded on fact. All symptoms of gout, wherever they appear, arise from one specific cause, the universal prevalence of the constitutional disease, which it is notorious lies dormant, and may be excited to action in different parts, by an adventitious stimulus to those parts: hence the action of indigestion, acidity, or, any acrid matter internally, will cause gouty symptoms in the stomach, &c., and accidental injuries externally will excite the gouty matter to action, which will first appear on or near the part, where the injury was received, and afterwards spread in succession, and it is remarkable, that the violence abates in the part first attacked, when the diseased action is excited in another, for instance, one foot is first attacked, it soon appears in the knee or the other foot, and gradually abates in the first as it increases in the second.

To remove the gouty affection from the stomach, &c., it has been a practice to give very strong spirituous waters, tinctures, &c., a very dangerous one indeed, because they are without doubt acrid stimuli, and will rather tend to increase than lessen the symptom: certainly the most rational way of relieving this is by exciting a greater stimulus in a distant part, as by blisters on the extremities, and consequently producing a greater action of the specific disease at those parts and an outlet to some of the matter: as nature actually teaches us herself in the usual progress of the gout from one part to another. It will at the same time be necessary to remove the acrid matter, which excites this attack, from the stomach and intestines, by purgatives, and to dilute it and promote its evacuation by some bland inoffensive liquor, as barley water, water gruel, or mucilage of gum arabic and water, to which may be added a small portion of fixed alkaline salt, which will blunt its acrimony at the same time and render the exhibition of anodyne medicines more efficacious. Clysters may be likewise employed, though not so useful as cathartics.

From an attentive view of the matter I am induced to think that acids are not even a proximate or exciting cause of the gouty paroxysm: for excepting the acid vomiting when the gout attacks

the stomach, the cause of which has been accounted for from the impaired state of the digestive powers occasioned by the superabundance of the gouty matter, there is no appearance of acids; and as the production of this acid is the effect of the disease and not the cause of it, and happens equally when that organ is affected with inflammation from other causes, it must be regarded as an adventitious production. It was therefore an erroneous practice to forbid the use of acids in the gout; which has been inculcated under the supposition that they were the causes of it: from this idea physicians have denounced the pains and penalties of a multiplication of arthritic torments upon the gouty sufferer who uses them, but as the existence of this cause was imaginary, so was the prohibition wrong: nor can I see any reason why the arthritic should, in the febrile stage, be debarred from the use of cooling acid drinks, when the gout attacks any other part but the stomach. I certainly would preclude their use when the gout attacks the stomach, for the same reason that the dilution and evacuation of the acid generated by disease at that time, were recommended; because it would be absurd to add to acid already too redundant in that sensible irritable organ; now rendered more so by the gouty inflammation: indeed wine or any irritating fluid ought not

to be taken in this state of it: but when the inflammation is in the extremities, and nature points out the necessity of the advantage to be gained by their use, it would be cruelty in the extreme from a false theory, to deny the afflicted the comfort of quenching insatiable thirst, and correcting a manifest tendency to putridity in the first passages, by an agreeable acidulous beverage. Strongly impressed with those ideas, I have always freely indulged myself in the use of vegetable acids, and with considerable benefit, not only during the paroxysm, but, when in health and free from it, and have strenuously recommended it to others. Far different has it been with others, who, bigoted to erroneous opinions, have already rendered their juices putrid; as appears evidently from the smell of their breath, &c., by the accumulation of more heat, and denying themselves the use of acidulous liquors.

It is well known that the animal juices in the first passages are disposed to be alkalized and putrid in the advanced stages of fevers, in that state are taken up by the absorbent system in the intestines, particularly the lacteals, are carried into the course of the circulating fluids and increase the disease: indeed I believe that the nervous system is thus affected, and coma subsultus and delirium are chiefly

owing to this cause. Provident nature, in that case, raises a strong inclination in the sick, for cooling acid liquors, to allay the thirst and heat, which liquors will absolutely destroy the cause of those afflicting symptoms, in destroying the alkalescent putridity in the stomach, &c. The distressing heat and thirst which the arthritic labouring under fever endures no one can judge of but he who has felt them: I am fully competent to speak of this situation of the gouty sufferer from many years' experience in my own person. I am therefore fully persuaded that acids so far from being the causes of gout are excellent remedies, in the inflammatory stage of it, when the fever runs high: though certainly for obvious reasons when calomel is administered to the patient, acids must not be taken.

As gouty persons advance into the vale of life, the inflammatory symptoms gradually decline in every succeeding paroxysm, and the disease becomes rather chronic, the rigid limbs are distressed with debility, and frequently chalky concretions are found in their vicinity. In this state the treatment must differ: still however gentle doses of the calomel anodyne become of great use in opening the secretions at first, and blisters are of great utility. The patient should use wine liberally, camphire occasionally, and large doses of musk, about thirty or forty

grains twice or oftener in the day. The musk has a sedative as well as a neurotic and antispasmodic power (spasm in this state of the disease being very common and distressing) and if opium disagrees, or induces a torpidness or stupefaction, which it sometimes does, musk will be found an excellent substitute: and the bark must be given with freedom to strengthen the tone of the viscera, with chalybeates and bitters. It is of the greatest consequence to admit free air, and as soon as possible for the recovering patient to use exercise. Horseback is excellent if the patient can bear it, if not, a carriage, and he ought to walk, as soon as he can. The flesh brush and dumb horse, have their utility in a remarkable manner in convalescence.

To prevent chalky concretions and stiff joints, I have long used a medicated water strongly impregnated with fixed air, and drink a pint daily with or without wine. We have good grounds to believe that the chalky matter is the earth of the bones, which is constantly renewing and separating, in a state of solution in our joints, and in a healthy state is carried out of the body, but by disease may be separated from the fluid in which it was dissolved, and detained in some deposite. Upon a supposition that fixed air is the principle which keeps it in solution in the fluid, I have used this water,

and have reason to conclude from my own feelings that my suggestion was right: I may appeal to facts in my own case. I have no chalk stones, and after my fits of the gout are over I have the free use of my joints.

With regard to regimen, much has been said by authors upon the apparent cures of the gout by observing a particular one. The reason of which mitigation of disease may be accounted for by the theory of the contrary effect of the redundant earth of the bones remaining in the habit, from the escape of the aerial acid, which would have held it in solution in the system, till expelled by the emunctories. The labourer and mechanic must certainly eat less animal food than their brethren in more opulent circumstances in middle life: and therefore have less earthy matter of bones furnished, and of course less redundancy of it to be carried off. Their laborious exercise superinduces a firmer tone of fibre, greater strength and agility, and the animal functions are consequently better performed; in particular the glandular secretions: and hence that redundancy of earthy matter which we have supposed to be in less quantity, is more easily and fully carried out of the constitution by the emunctories. So that if a labourer has even a claim to gout from his progenitors, he has less of the presence of this, what may

be called, natural cause of exciting the latent matter into action, than the other class of men. For this reason if we take a view of the men in middle life, who have a claim to gout from descent, we shall find their state the reverse of that of the hard working man. The man of middle life, in which may be included the three learned professions of Divinity, Law, and Physic, the merchant, Shopkeeper, and wealthy mechanic, &c., has generally a plentiful table of animal food in its different varieties, which, affording more delicacies than the vegetable kingdom, constitutes almost wholly his diet. Of course more of redundant earth of bones is furnished in his constitution than in that of the labourer, and from his habits of life, and perhaps avocations, he uses less exercise, and is more prone to indolence, he is less athletic, and the animal functions are performed with less regularity and order, and consequently the glandular secretions must suffer: if therefore more earth of bones is formed, the redundancy, having less chance of being carried off by the emunctories, must accumulate in the habit and become an exciting cause by its stimulus of rousing the latent gouty matter into action and producing a paroxysm.

From the foregoing considerations it would appear that in order to relieve the arthritic man in

middle life, from frequent attacks of gout, he must by regimen be reduced nearly to the condition of the labourer. He must live temperately, abstain almost wholly from animal food, drink of the limpid stream, or home-brewed new beer, and condemn himself to laborious exercise in the field in the open air, for some hours in a day. According to our conjecture his vegetable diet will afford less redundancy of the earthy matter of bones, will also, with his fermenting beverage, afford him more fixed air to keep it in solution, until it is expelled, and his labour will increase the vigour of the system and the secretions and animal functions in general. From a view of our theory there is a possibility that the paroxysms of the gout might be thus suspended, but the distemper would be by no means cured, and upon any future deviation from this regimen would make its appearance.

Dr. M. Adair, in his cautions to invalids, mentions an instance of an attorney, who by regimen of this kind escaped the gout for, I think, sixteen years: but being persuaded that this long exemption from it must indemnify him from future attacks, he returned to a more liberal diet, and in six weeks afterwards had a most severe fit of the gout.* This

* This single instance is by no means sufficient to establish a theory upon. Such is the versatility of this disease that from some inexplicable cause this

is a proof that the gout remained dormant in the constitution and only waited for a stimulus to bring it into action. But the rigorous prosecution of such a regimen could only take place in vigorous arthritics of the middle age. Men of this description might probably with advantage try this, but it must be thought too dangerous an experiment for an aged and infirm arthritic, who must require a nutritive and generous diet to support a worn out debilitated frame.

I shall conclude with observing that the theory which has been advanced in these letters, has been adduced from observations on what have appeared to me to be facts. I am open to conviction if it should be proved that I have been mistaken in my conclusions. But of this from experience in yourself, you, my dear Sir, if you live long enough (which I hope will be the case, many years, as well for the benefit of mankind, as your relatives) you will be sufficiently enabled to judge. If the theory be erroneous, reject it; but the practice is entitled

gentleman might have had this long interval between the paroxysms, if he had not lived in this manner. I know several who live liberally and some hard drinkers, who have intervals of nine or ten years; and again I know many abstemious men affected with it severely, for some months, in succession, or at very short intervals, every year: yet ought hard drinking to be avoided and regularity of conduct observed, as must be obvious to common sense.

to more indulgence; because it is chiefly founded on results from the experience of many years in my own person.—I therefore presume that candour will give me credit for them, until they are refuted by as long a course of experiment on other people.



From the Editor, Mrs Hamilton?
to the London Medical Society.

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Thomas Piper Jun^r
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Surgeon

LONDON MEDICAL SOCIETY

